ARCHÆOLOGICAL SURVEY OF INDIA.

NEW IMPERIAL SERIES, VOLUME XV.

SOUTH INDIAN BUDDHIST ANTIQUITIES;

INCLUDING THE

STUPAS OF BHATTIPROLU, GUḌIVÂḌA, AND GHAṆṬASÂLÂ AND OTHER ANCIENT SITES

IN THE

KRISHṆA DISTRICT, MADRAS PRESIDENCY;

WITH NOTES ON

DOME CONSTRUCTION; ANDHRA NUMISMATICS; AND MARBLE SCULPTURE.

BY

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SUPERINTENDENT, ARCHÆOLOGICAL SURVEY, MADRAS.

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PREFACE.

THE present volume contains the results of excavations conducted at the ruined stupas at Bhattiprolu, Gudivada and Ghantasala during the beginning of 1892.

It is to be regretted that all these works, in common with most others of their class, have suffered at the hands of those who required material for the construction of roads or other such works. Though among the oldest existing monuments of an ancient civilization, their great antiquity was no protection from the despoiling hands of the adjacent villager, who scrupled not to destroy the finest works of art to provide material for the building of his wretched mud shrine. These despoilers were only gradual in their operations, as some examples which have existed up to the present time show; and had they been the only ones, much more of these buildings might even yet have existed; but unfortunately there were others less excusable, who systematically reduced those buildings as they would a quarry. It was thought that this species of vandalism was only practised before the historical and artistic value of these ancient works was appreciated; but even yet, in spite of Government orders to the contrary, we occasionally hear of it. Such being the case, we can only unearth and endeavour to piece together such remains as have escaped the notice of the despoilers. We have been able to gather from these—in many cases seemingly shapeless mounds—that the architectural works of the Buddhists have never been excelled by any of later date existing in India. Unlike the later architecture of the Dravidians, their buildings not only contained master-pieces of detail, but the buildings were themselves perfect examples of architectural composition.

The most important results of the excavations were achieved at the former of these stupas. These show what may still lie buried in buildings which have seemingly been denuded of everything valuable. This temple had been examined and declared utterly ruined, with nothing of value in it left; yet buried in the centre of the masonry were important historical documents in a form of alphabet hitherto unknown. Independent of the importance of the inscriptions themselves, their position in the building gives them an infallible index to the date of its foundation. Inscriptions placed around a building may have been engraved at or subsequent to its erection, but these can be

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Regarding the character of these recently discovered inscriptions, which are written in a new variety of the Southern Maurya or Lât alphabet, Dr. Bühler writes:*

"The Bhaṭṭiprôlu inscriptions cannot be placed later than 200 B.C., and may even be a little older. If this estimate is correct, their characters prove (what, indeed, is also made probable by facts connected with Aśoka's edicts) that during the third century B.C. several well-marked varieties of the Southern Maurya alphabet existed. For they contain a perfectly worked-out system, which cannot have sprung up in a short time, but must have had a long history.

"The importance of this result lies herein, that it removes one of the favorite arguments of those scholars who believe the introduction of writing into India to have taken place during the rule of the Maurya dynasty or shortly before its beginning. It has been stated repeatedly that one of the facts, proving the Aśoka edicts to belong to the first attempts of the Hindus in the art of writing, is the absence of local varieties among the letters of versions incised at places between which lie distances of more than a thousand miles. This argument is based, as I have pointed out more than once, on imperfect observation; and it may be met also by the obvious objection, that Aśoka's edicts were all issued from the same office, and that the importance naturally attributed to the writing of the royal clerks at Pâṭaliputra might be expected to influence the copyists in the provinces, and to induce them to imitate as closely as possible the shape of the letters used at head-quarters. Nevertheless, if the Bhaṭṭiprôlu inscriptions now show a system of writing, which, in some respects, is radically different, and which may be reasonably supposed to be coeval with that in Aśoka's edicts, they furnish a very great help to those who, like myself, believe the art of writing to have been practised in India for centuries before the accession of Chandragupta to the throne of Pâṭaliputra."

The great majority of the mounds hitherto examined are situate in the Krishṇa district, where numerous unexplored remains yet exist. But as this district marks the southern boundary of the districts which ought to be rich in Buddhist remains, we may expect to make even more interesting discoveries when those to the north of it are explored. The rock-cut monuments at Nâgalapalle, and the more recently discovered remains of stûpas and monastic buildings at Arugôlu in the Godávari district, are examples of what may be expected. The latter were brought to notice by Mr. Higgens, the Collector of Godávari, who, appreciating the importance of these remains, ordered that their destruction to provide bricks should cease.

When these mounds are catalogued under the orders of Government, we will have some record of what really exists and know exactly where to go to

* *Academy*, 28th May 1892.

them. At present, without a knowledge of their locality, much time will be wasted in searching for them, and even then, some would be certain to escape notice. When this is done, we may expect less instances of dismantling of these ruins to occur; cases which being carried out in unknown localities are probably never heard of, or, if so, only after irreparable damage has been done.

It has not been thought necessary to include any historical notes on the Andhra dynasty whose works these are. All present available information on the subject has been utilized by Dr. Burgess in his recent work on Amarâvati.

The references to published works on other examples of the class of monuments described in this volume are much less complete than I could have wished; but they include all that I have been able to make available. The work is thus chiefly confined to descriptions of the actual results obtained by survey. Further comparisons with such works and deductions resulting therefrom must be left to those who may possess better means of reference.

BANGALORE, A. REA.
29th November 1892.

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REPORT

OF

THE ARCHÆOLOGICAL SURVEY OF SOUTHERN INDIA.

SOUTH INDIAN BUDDHIST ANTIQUITIES.

CHAPTER I.

CONSTRUCTION OF DOMES OF SOUTH INDIAN STÛPAS.

THE evolution of the various forms of plan or construction which is seen in stûpas, would seem to have followed a definite course; and a consideration of it may form one of the indications which point to their relative dates. At first the stûpas were built solid; but when larger ones were undertaken, this was too laborious or expensive. The building of a hollow dome and filling it with earth might be satisfactory in a small structure; but in a large one, it would not be a success, for the walls would fracture and fall out. Various expedients, such as the construction of masonry floors across the earth-packing, would be tried; and latterly the idea of placing interior supporting walls would suggest itself.

In describing the results of the excavations recently conducted at the three stûpas of Bhaṭṭiprôḷu, Guḍivâḍa and Ghaṇṭasâlâ, it may be of interest to compare the different methods employed in the construction of the brick domes of these, with those of the other South Indian stûpas as yet examined. These buildings are ten in number, and are all situated in the Krishṇa district.[1] Some others there are at Nâgalapalle in the Ellore taluk of the Godávari district, but they are simply very small dâgobas grouped on platforms and are built of stone; they are hollow domes filled with earth. Except these, no other stone-built examples are known in Madras. In the construction of immense hollow domes of semi-spherical or flatter section, having no trace of arching, but with unmortared bricks laid from base to summit in horizontal courses, even though—as is not always the case—the bricks were good, it is evident that to prevent fracture, especially at the crown, some considerable skill was required. When the dome was of solid brick, only the secureness of the foundation would require to be looked to; but in the majority of these examples, this construction, whether from the expense of the immense number of bricks necessary or otherwise, has not been adopted. The materials used for packing the centre are earth, mud and concrete. In small structures, where sinking of the foundations, and consequent fracture of the masonry is not liable to occur, an earthen packing may be perfectly safe; but in large domes, any sinking of the wall may cause cracks which admit moisture, when the

[1] Amarâvati, Bhaṭṭiprôḷu, Guḍivâḍa, Garikapâḍ, Jaggayyapêṭa, Pedda Maddûr, Pedda Gañjâm (three stûpas), and Ghaṇṭasâlâ.

expansion and contraction of the material is certain to cause the destruction of the dome. In some cases, this has been obviated by brick, concrete, or stone floors stretching across the interior at intervals in the height. Examples occur at Jaggayyapêṭa, Garikapâḍ, and Pedda Gañjâm. Others have cross walls in the interior with a mud-packing. Examples are at Ghaṇṭaśâlâ and Pedda Gañjâm. Solid domes are found at Guḍivâḍa and Bhaṭṭiprôlu; and these are undoubtedly the earliest of these stûpas. Properly made concrete is as secure as masonry, and, where limestone is abundant, can be cheaply made. This consideration may have led to its use at the Garikapâḍ stûpa. A simple earth-packing seems to have been generally employed only in the smaller buildings. The largest have interior cross walls in addition, or are of solid construction throughout. In few of these examples does sufficient of the facing of the superstructure remain to attest with certainty its original form. Most of them are razed to the level of the surrounding basement, with only a few courses of the upper exterior wall remaining; and a low mound of debris or masonry inside it. In the smaller structures, it may be confidently asserted that the dome was the form of outline. In the largest the building may have been constructed as a dome or in storeys. Those about which there is any question are Amarâvati, Guḍivâḍa and Ghaṇṭasâlâ. When Colonel Mackenzie first saw the Amarâvati stûpa, "the central or higher portion of the mound was still untouched, and rose in a turreted shape to a height of 20 feet, with a diameter of about 90 feet at the top, and had been cased round with bricks.[1] Its then form may, however, have been due to its being ruined; its original shape was probably a dome as represented on the sculptures. On account of the centre of the Amarâvati stûpa having been completely destroyed before accurate observations of its interior construction were made, it is now impossible to know whether it may have been constructed of solid brick or otherwise. Colonel Mackenzie, who visited the site in 1797, states:[2] "I found a circular trench about 10 feet wide, dug about 12 feet deep, into a mass of masonry, composed of bricks of 16 inches square and 4 inches thick. It is probable that this body of masonry did not extend to a greater depth. The central area was untouched; and a mass of rubbish was thrown outside of the ditch, which prevented any observation of its original state; but I conjecture that the whole had, previous to its opening, formed a solid circular mound." The base of this building was about 138 feet in diameter.[3]

The stûpa at Bhaṭṭiprôlu has a dome 132 feet and a base 148 feet in diameter. It is solid brick throughout.[4] The bricks are of very superior manufacture. At Bhaṭṭiprôlu, a portion of the facing wall of the dome remains at the south-east quadrant. It is 5 feet 6 inches in height and has a batter inwards of 1 foot 2 inches, thus showing that it was a dome of a section of less than a semi-diameter.

The Guḍivâḍa stûpa has been constructed of solid and well-made brick. It has been so much demolished that its size and form cannot now be ascertained; but, from what remains, it would seem to have approached those at Amarâvati and Bhaṭṭiprôlu.

The Ghaṇṭaśâlâ stûpa is 122 feet 2 inches in diameter at the base and 111 feet at the wall above it. Its plan differs from any others known in the Madras Presidency. The nearest approach to it is the second stûpa at Pedda Gañjâm. It has an outer ring of brick-work 18 feet 3 inches thick, exclusive of the basement, which is 5 feet 7 inches broad. Inside is a concentric circle 55 feet 10 inches in exterior diameter, and with a wall 3 feet 6 inches thick: this seems to have been the dome wall. In the centre is a square cube of

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[1] Burgess: *Amar. and Jagg. Stûpas*, p. 20.

[2] *Ibid.*, p. 13.

[3] *Ibid*, p. 21.

[4] Madras G.O., No. 207 P., of 22nd April 1892.

solid brickwork surrounded by a hollow brick square. Cross and radiating walls connect these other walls; the small cells or chambers thus formed are firmly packed with black mud. The bricks of which the walls are constructed are of very inferior make. At Ghaṇṭa-śâlâ, the interior walls would suggest storeys as having been employed. These walls may, of course, have been used simply to strengthen the outer wall if it rose in the form of a dome; but its thickness of 18 feet 3 inches is proportionately much greater for a dome wall than in any of the other examples, where a ring dome was undoubtedly employed. The wall of the inner circle is of the usual proportions, and the dome would seem to have risen over it.

The stûpa at Garikapâḍ is constructed of an outer brick ring, 8 feet thick at the base, with alternate layers of concrete and earth in the centre. Its diameter across the base is 81 feet.[1]

At Jaggayyapêṭa, the stûpa has an outer brick casing with an interior packing formed of "layers of earth about 2 feet thick, over each of which was laid a close flooring of very large bricks closely fitted together." The diameter of the building is 31½ feet.[2]

The remains of the small stûpa discovered on the hill at Pedda Maddûr near Amarâvati show a diameter of 44 feet 6 inches, with a base wall 4 feet thick. It seems to have been packed with earth laid over a mass of large boulders.[3]

The largest of the three stûpas at Pedda Gañjâm has been a hollow brick dome, packed with earth. A floor of packed stones runs across the interior near the foundations and may have been repeated at intervals in the height. In the centre of the foundations are a number of bricks in the form of a svastika. The diameter of the building at the base is 74 feet, with a wall thickness there of 10 feet. The dome wall has been 3 feet thick.[4]

In the remains of the second stûpa at Pedda Gañjâm, the plan is two concentric brick circles separated from each other by a breadth of 4 feet 10 inches, and the two connected by twelve cross walls radiating from the centre; four of these walls project inside the inner circle. The exterior diameter of the outer circle is 38 feet 10 inches, with a wall thickness of 3 feet 10 inches; the outer diameter of the inner circle is 21 feet 6 inches, with a wall of 2 feet. As only one course of the bricks remains, it is impossible to say what the packing has been, but it was probably earth.[5] The foundations of a third stûpa were found here, having a diameter of 32 feet. It is a brick ring packed with earth, having a square pit in the centre packed with stones. Whether these latter extended up to the crown is uncertain.

Every one of these buildings has or had a square projection on the basement at each of the cardinal points opposite the four entrance gateways in the rail. From sculptured representations, these seem to have been intended as an architectural feature to give prominence to, or support the five stelae, which stood opposite these points near the dome. In the earliest stûpas, such as Bhaṭṭiprôḷu, Jaggayyapêṭa, and Garikapâḍ, of the marble slabs which encased the basement, only those at the projections were sculptured.

It has been thought that the curious small circular shaft in the centre of the Bhaṭṭiprôḷu stûpa might have been the receptacle for the strong wooden post that supported the covering umbrellas. A similiar but square shaft was found in the centre of the Ghaṇṭaśâlâ stûpa. That building has a greater proportional height of the dome intact, and the top of this shaft was closed with original brickwork, so that with it—unless the well had been again resumed

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[1] Madras G.O., No. 383 P., of 30th April 1889.
[2] Burgess: *Amar. and Jagg. Stûpas*, pp. 107, 108.
[3] Madras G.O., No. 383 P., of 30th April 1889.
[4] Madras G.O., No. 703 P., of 14th July 1888.
[5] *Ibid.*

at a greater height,—it could not have served the purpose supposed. It may also have been so with the Bhaṭṭiprôḷu stûpa, though now, of course, it is impossible to ascertain whether it really was so. There seems reason to believe, from the fact of a stone umbrella post found at Nâgalapalle, from the umbrellas being stone, and from the sculptured representations, that the umbrella post also was of the same material. The small well may have served as a receptacle for fixing a sweep during the progress of building to guide the correct laying of the circular rings of brickwork.

CHAPTER II.

RAILS.

The detached enclosing rail is a well-known feature of these buildings, but in the examples under note, no remains of any have been found except at Amarâvati and more recently at Bhaṭṭiprôḷu. The most complete rail is that at Amarâvati; its features have been fully described by Dr. Burgess. The subject generally has been treated by Mr. Fergusson.[1] His remarks refer chiefly to North Indian stûpas; the only one in the south, about which much was then known was Amarâvati. Most, if not all of these buildings in South India, have been greatly demolished, and we cannot expect to gather from their remains any very complete ideas of their construction, but much may be gained by a careful piecing together of what has been left of them. From an examination of these buildings, it seems doubtful if any detached rail ever did exist at some at least of the smaller ones. These stûpus generally have a flooring of bricks, or stone flags extending and forming a lower procession path around the basement, on the outer edge of which stood the principal rail, where one existed. Of the rail at Bhaṭṭiprôḷu, only a fragmentary portion has been uncovered. The size and spacing of the piers would seem to show that the cross-rails had been lenticular in shape and unsculptured like some fragments of one which were found at Amarâvati, and are now being pieced together and fitted up in the Madras Museum. It resembles one from Sâñchi, illustrated by Mr. Fergusson.[2]

Although every stûpa may not have had a detached rail, all would seem—to judge from examples which remain complete enough to show the feature—to have had an inner rail or parapet on the edge of the basement or raised procession path, formed by the casing slabs over-topping it, and a coping panel on the top of them. From sculptural representations Mr. Fergusson had inferred that this feature existed in the large tope at Sâñchi.[3] It is clearly shown on all the Chaitya slabs found at Amarâvati, and subsequently at Pedda Gañjâm and Ghanṭaśâlâ. Undoubted traces of this feature have been found at one of these stûpas. At Pedda Gañjâm a number of slabs, similar to plate XXVII of the present work, were found standing in position against the basement wall, with their tops above the floor line of the upper procession path. Traces of the brick support for the raised inner rail or balustrade over them also remained there. This must have consisted of a marble coping laid along the top of the casing slabs similar to some at Jaggayyapêta.[4]

At Ghanṭaśâlâ, the height of the basement wall against which casing slabs would, as usual, be placed is 4 feet 3 inches. The heights of two slabs which have been found (pls. XXVII and XXVIII) are 4 feet 9 inches and 4 feet 7½ inches. If these slabs were among those from the basement wall, and,—as such panels have only been found in this position—it seems probable that they were, it is evident that independent of any coping over them their tops would surmount the procession path. Examples of coping slabs which must have been so placed are elsewhere illustrated (pls. XVI and XXVI).

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[1] *Ind. and East. Arch.*, p. 84 et. seq.

[2] *Ibid.*, pl. 30.

[3] *Ibid.*, p. 64.

[4] *Amar. and Jagg. Stûpas*, pls. LI, figs. 1 and 3, and LIV, fig. 2.

The preceding observations refer chiefly to the stûpas built of brick, which have the upper procession path, round the base of the dome, of a breadth about equal to or greater than the height of the surrounding basement wall. In this, their proportions differ considerably from some in the north. Sâñchi, for example, has a basement height of 14 feet, and an offset above it of about 6 feet.[1] The buildings at Nâgalap̣alle form an exception to the rule followed in the others. As has been remarked, however, they are mere small structural stone dâgobas. Their proportions are identical with a rock-cut dâgoba in an adjoining cave. One of the largest is 15 feet in diameter, with a base 7 feet in height, and an offset over it with a breadth of 12 inches only. This, it is evident, is only a simulation of the architectural feature of a procession path, though it could not have been used as such. It would require no balustrade or rail around it.

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[1] Fergusson: *Ind. and East. Arch.*, p. 64.

Details of Construction of the Stûpa.

Fig. 1. Arrangement of bricks in the centre.

Outside are large square bricks, laid in circular courses.

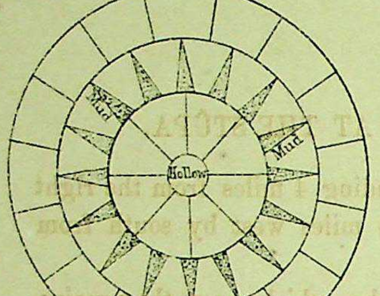


Fig. 2. Section of Central Excavated Well.

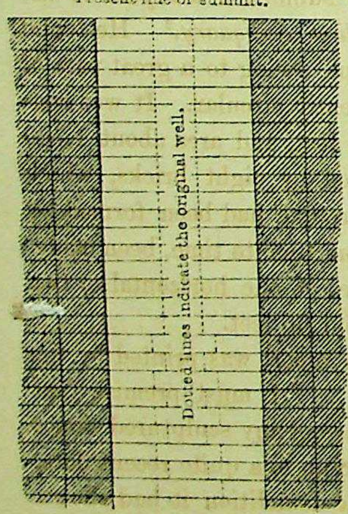


Fig. 3. Section of lower part of Dome, and rais procession-path at south-east quadrant.

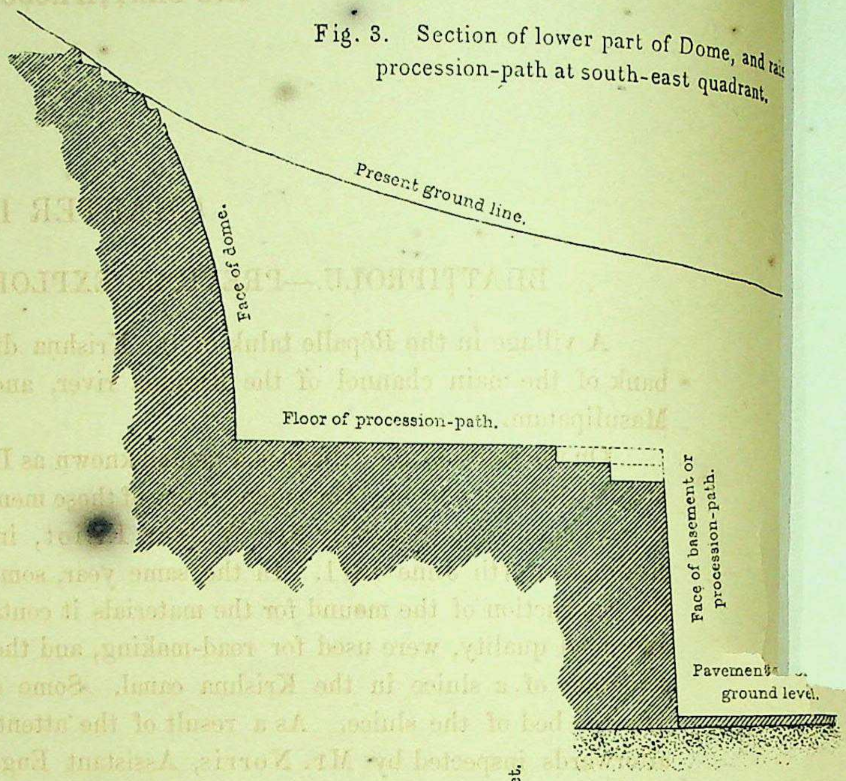


Fig. 4. Section of the lower part of a Marble Rail Pier.

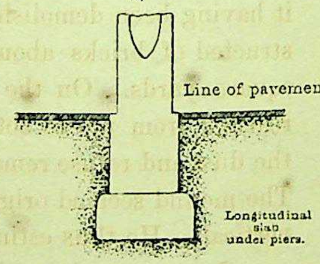
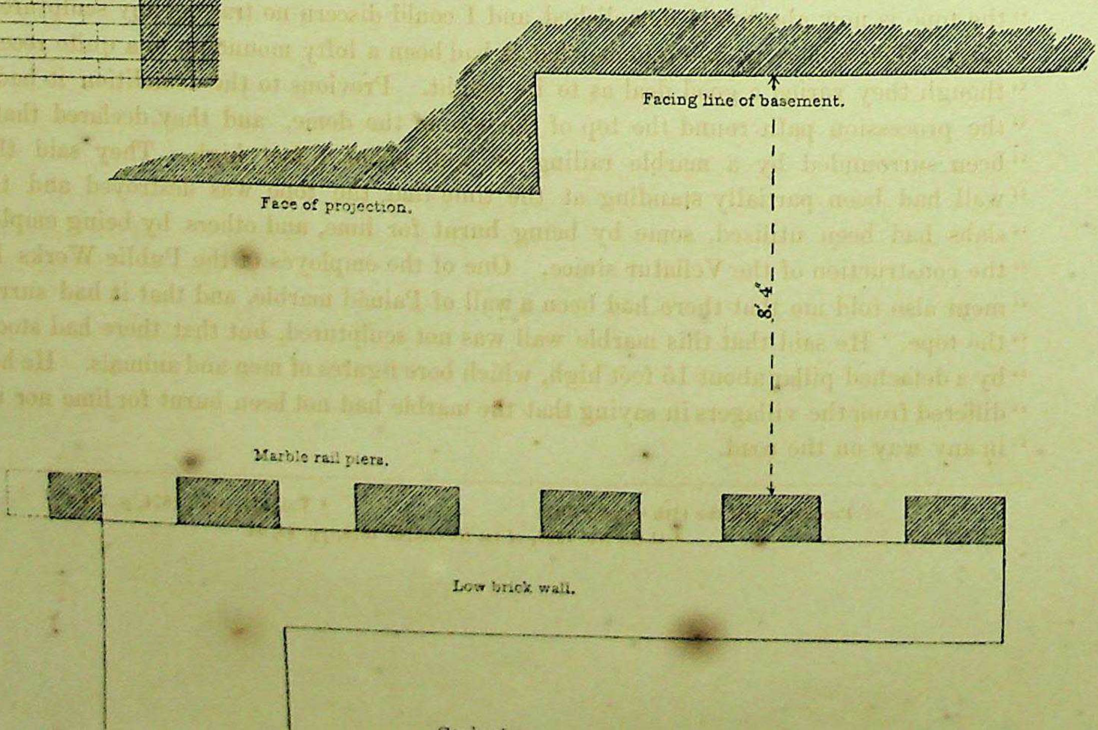


Fig. 5. Plan of Rail Piers, uncovered on north side.



CHAPTER III.

BHAṬṬIPROḶU.—PREVIOUS EXPLORATIONS AT THE STÛPA.

A village in the Rêpalle taluk of the Krishṇa district, standing 4 miles from the right bank of the main channel of the Krishṇa river, and about 24 miles west by south from Masulipatam.

On the south of the village is a mound known as Lañja dibba, which covers the remains of a Buddhist stûpa. The mound is one of those mentioned in Mr. Boswell's report (1870). It was again referred to by Sir Walter Elliot, in a letter printed in Government Proceedings of 7th June 1871. In the same year, some correspondence took place regarding the destruction of the mound for the materials it contained. The bricks, being of large size and good quality, were used for road-making, and the marbles variously utilized in the construction of a sluice in the Krishṇa canal. Some of these may at present be seen built into the bed of the sluice. As a result of the attention thus called to it, the mound was afterwards inspected by Mr. Norris, Assistant Engineer, who submitted a report to the Madras Government.[1] A note was also published in the *Indian Antiquary*.[2] He found the mound to be a solid mass of brickwork of very irregular shape, owing to a great part of it having been demolished for road metal; but the form was evidently circular. It was constructed of bricks about 1′ 6″ × 2′ 0″. Its height was about 14 feet, and area about 1,700 square yards. On the top was a small circular hole, surrounded by eight bricks, which reached from top to bottom. An earthen bank, which existed around, had been formed by the dust and refuse remaining from the demolitions which had, from time to time, been made. The mound seemed originally to have been a cone, with side slopes of one horizontal to two vertical. He thus estimated the original height to have been about 66 feet.

Some years later the tope was visited by Mr. Sewell, whose report was printed by the Madras Government.[3] He elicited the following facts: " . . . . I must premise that "the tope is now absolutely demolished, and I could discern no trace of any sculptured stones "there. The village people told me that it had been a lofty mound up to a quite recent date, "though they varied a good deal as to its height. Previous to the demolition it had shown "the procession path round the top of the base of the dome, and they declared that it had "been surrounded by a marble railing or wall about 4 feet high. They said that this "wall had been partially standing at the time that the tope was destroyed and that the "slabs had been utilized, some by being burnt for lime, and others by being employed in "the construction of the Vellatur sluice. One of the employés of the Public Works Depart-"ment also told me that there had been a wall of Palnád marble, and that it had surrounded "the tope. He said that this marble wall was not sculptured, but that there had stood close "by a detached pillar about 15 feet high, which bore figures of men and animals. He however "differed from the villagers in saying that the marble had not been burnt for lime nor utilized "in any way on the road.

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[1] Proceedings of the 11th October 1872.

[2] Vol. III, April 1874, p. 124.

[3] G.O., No. 1620, of 1st November 1878, pp. 33, 34.

"That there really were marble sculptures is tolerably conclusively proved by the fact "that in the walls and floor of this very Vellatúr sluice marbles have been extensively used. "Some sculptured stones bear carvings assimilating in type to those at Amarâvati though "they do not appear to have been so beautifully executed.

"There can be little doubt, therefore, that up to recent times this tope was the best pre-"served in the locality. It had the dome, probably not perfect, but at any rate in fair "preservation. It had at least one standing *Lát*. It had the procession path clearly apparent, "and it had a marble wall or railing round it. Mr. Norris has called attention to the curious "circular shaft, a few inches in diameter, running down the centre of the dome, which was "probably the receptacle for the strong wooden post that supported its covering umbrella or "umbrellas. All this has disappeared, and in its place remains a shapeless heap of earth "and broken brick, 14 feet high at its highest, while the canal water streams muddily over "the last fragmentary remains of marble rails and sculptured *Lát*. . . . ."

Mr. Sewell elsewhere remarks: [1] "I have it direct from the officer chiefly concerned "in the demolition that the mound was between 30 and 40 feet high, of a circular shape like a "dome, but ruined at the top; that there was a marble pillar standing erect, and sculpture here "and there in marble, but he does not remember rails or walls of marble. He found inside the "dome a casket made of six small slabs of stone dove-tailed into one another, measuring "about $2\frac{1}{2}' \times 1\frac{1}{2}' \times 1'$. Inside this was a common clay chatty, and inside the chatty a neat "casket made of soap-stone, [2] which contained a crystal phial. In the phial was a pearl, "a few bits of gold leaf and some ashes. Wishing to remove his discoveries, the stone casket "was accidentally broken and the remains were left at Bhaṭṭiprôḷu. The chatty was also "broken. The 'soap-stone' casket was smashed during a voyage to England and the frag-"ments thrown away. The crystal phial was presented to Dr. Burnell."

Mr. Boswell in a report [3] to the Madras Government, and referring to the remains at Bhaṭṭiprôḷu, says that during the demolition a stone casket was found, "inside of which "was a crystal vial with some seed, pearls, &c. The natives say that another bottle was broken "in digging, which contained the secret of alchemy, the substance capable of turning all other "metals to gold. They also firmly believe these structures cover some hidden treasure, and "from the fact of a five-headed Naga being discovered, this has been taken to fix the actual "amount at five crores . . . . These remarkable structures have been entirely covered "up and buried with a mass of earth, which has preserved them through long centuries, during "which their history and purposes have almost perished and have certainly become forgotten "in the neighbourhood, where they were originally raised. With all the interest that attaches "to the Buddhist era of Indian History, it becomes us to deal reverently with these relics "that time has spared. They are the evidences of a past age of civilization. When we have "carefully disinterred them and brought to light the symmetry and proportions of their "architectural designs, we shall probably find that they are worthy of a better fate than "to make district roads."

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[1] *Topographical Lists of Antiq.*, vol. I, p. 77.

[2] "By 'soap-stone' I understand a material similar to that of which the Amarâvati casket at the Madras Museum is composed."

[3] Proceedings of 14th December 1871.

INSCRIBED STONE RELIC CASKETS.

Fig. 1.

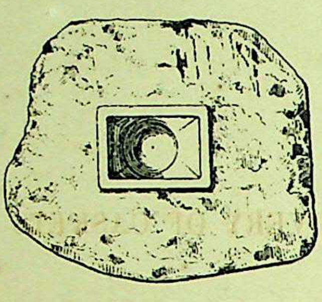
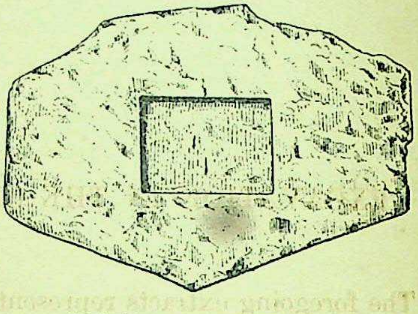
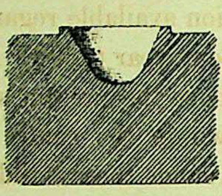


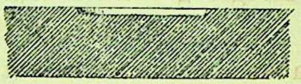
Fig. 2



No. 1. Casket.



Section of Receptacle of No. 1.



Section of Lid of No. 1.

Fig. 3.

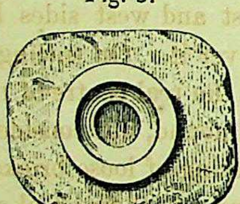
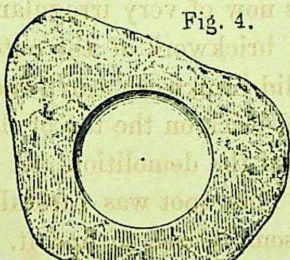
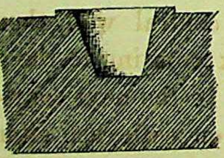


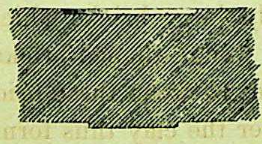
Fig. 4.



No. 2. Casket.



Section of Receptacle of No. 2.



Section of Lid of No. 2.

Fig. 5.

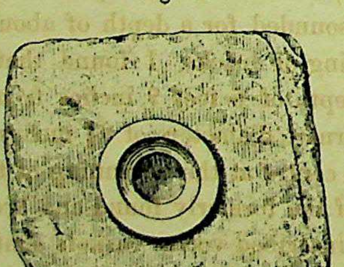
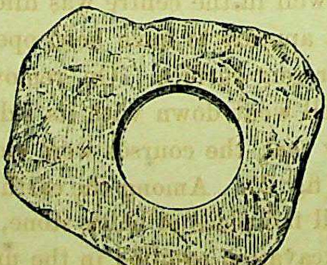
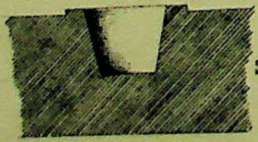


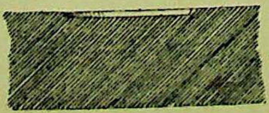
Fig. 6.



No. 3. Casket.



Section of Receptacle of No. 3.



Section of Lid of No. 3.

TE.—Inscriptions on the caskets are not shown.

CHAPTER IV.

EXCAVATION IN THE CENTRE, WITH DISCOVERY OF CASKETS AND RELICS.

The foregoing extracts represent all the published information available regarding this building. As a result of my visit in the beginning of the present year (1892), I learned that the above-mentioned casket had been found at a point just above the present summit of the mound. But as the principal deposit is usually placed down in the centre near the foundations, or at the level of the raised procession path which surrounds these buildings, and as the summit of the mound is at present 15 feet above that level, I considered it very probable that other relics might yet exist, buried down in the centre of the solid brickwork. The mound is now of very irregular shape, the upper half of the dome and about a quarter of the mass of brickwork of the outer radius on the north-east and west sides having been removed. Solid brickwork, earth and loose bricks appear all over it. On tracing the circular courses of solid brick on the top of the mound, it is found that the real centre of the buildings is, on account of the demolition, not now in the middle of the mound, but considerably to the north of it. This spot was carefully concealed under a covering of loose bricks and earth, and required some search to find it. On the debris being removed, the central courses were found to be untouched, and exactly as described by Mr. Norris, with the addition, that, outside the eight large bricks which radiate around the small central well, there is another ring of sixteen wedge-shaped bricks each placed with the apex pointing to the centre. The triangular spaces between these bricks are filled in with clay. In the next course, the bricks are placed under the clay thus forming a sort of bond, and so on with each alternate course. The plan of any one course, thus, has a perhaps not unintended resemblance to a lotus flower. Outside extend the circular rings of ordinary rectangular-shaped bricks (pl. II, figs. 1 and 2). The small well in the centre was filled with earth ; but, at the time the top of the stûpa was removed, it appears to have been open, and was then sounded for a depth of about 15 feet from the present surface. On removing the central ring of bricks, I found that the small central well went down with its sides straight for a depth of 5 feet 9 inches from the surface. Below that, the courses were stepped, leaving alternate diameters of 9½ inches and 1 foot 3 inches (fig. 2). Among the earth removed from the centre at the beginning of these steps was a small flat piece of black stone, a piece probably of the formerly found and broken casket. The excavation resulted in the unearthing of three inscribed votive caskets containing inner stone and crystal caskets, relics and jewels. They were placed at different levels near the foundations.

Plate I.

This plate shows the articles found during the excavation in the centre; it is divided by horizontal lines into three compartments. The uppermost shows the contents of the first receptacle. The articles in the upper part were those found surrounding the small globular stone casket. Those below them are the coins, beads, and flowers which were inside the globular casket. In the centre of the plate are the objects from the second casket. The lowest compartment has those from the third casket. Underneath stand the small inner caskets. On the left is the globular stone casket of the first receptacle with the cylindrical crystal phial, which stood inside it. In the centre is the second crystal phial. On the right is the third crystal phial and miniature beryl casket. These articles are now in the Madras Museum. They are described in detail in the following chapters.

CHAPTER V.

FIRST CASKET.

The bricks were removed for 14 feet 6 inches from the surface, or almost exactly on a level with the top of the raised basement or procession path which surrounds the dome, where a large irregular three-sided slab of black stone was found imbedded in the brickwork on the south side of the excavated shaft. It measures about 2′ 11″×2′ 6″. The two inner sides of the stone radiated from and touched the central well; its outer side was curved concentric with the brickwork. It proved to be the lid of a large stone relic casket (pl. III, fig. 2). Its under surface is smoothed, and has a rectangular cutting, measuring 11″×8″×½″ deep. It lay on the top of another similar but thicker stone which formed the receptacle for a number of relics (fig. 1). Its size is 2′3″×1′10″×13″. On its upper surface is a cavity, 5 inches deep, and circular on the bottom, but sloping up to a rectangular top with raised rim made to fit into the hollow in the lid. The length of the rectangle lay east and west. The upper surface of the stone is smooth, and, cut on it around the casket chamber, are two lines of an inscription in a new type of the Southern Maurya character.[1] In the cavity stood a globular black stone relic casket (pl. IV, fig. 7). Around this casket and mixed with the earth which filled the cavity were the following articles, of which a few are illustrated on the above plate: A copper ring (fig. 1), and several bits of copper; a small bead and two double pearls; two small semi-spherical cups made of a hard brown metal. They fit into each other, and are evidently the lid and receptacle of one vessel. On the apex of the lid is a gold bead. The other also has had a gold bead, which was found in the earth alongside (fig. 5). One bears traces of some sort of resin having been inside.

A hexagonal crystal (fig. 4, and pl. V [2]), with slightly convex sides, pierced with a hole through its axis. On each of the sides is lightly traced or scratched with one stroke for each line of the letters an inscription in a similar character to that on the stone. The first line of the inscription is indicated by a line drawn from the centre of the end to one of the angles. A similar but bent line appears on the other end in the middle of the third line of letters. It will be obvious that, being pierced, it must have been used for suspending around the neck, most probably as an amulet. Phylacterions were used by the Greeks and other nations of antiquity, and like this they usually bore inscriptions. The Liṅgayats, at the present day, suspend a like object, being a liṅga enclosed in a box.

Made of thin sheets of pure gold were two triśulas (pl. IV, figs. 2 and 3), and four flowers with eight petals, one of which is shown in figure 6. There were also a hollow single and a double gold bead and seven small triangular pieces of the same metal; these last are evidently pieces of a flower. As to the position these objects occupied in the cavity around the globular stone casket, the two small semi-spherical vessels lay on the west,

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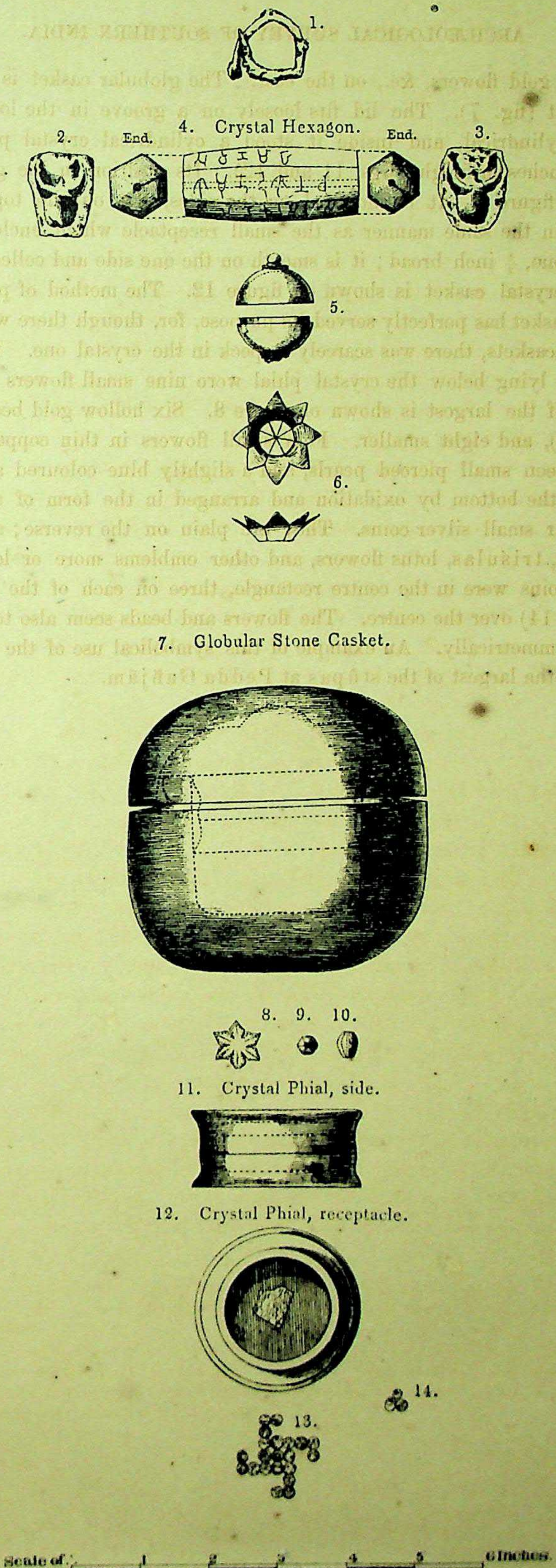
[1] For a note on this and the other inscriptions, see letter by Dr. Bühler in the *Academy* of 28th May 1892, *Jour. R. As. Soc.*, part 3, July 1892, pp. 602–609, and *Wiener Zeitschrift für die Kunde des Morgenlandes No.* 2, 1892. Translations will afterwards be published in the *Epigraphia Indica*.

[2] In the photographs in this plate two faces are shown on each figure. It was found that the reflection from the sides obliterated all trace of the letters when viewed in the camera. The remaining four sides of the prism had thus to be washed with indian ink. The two sides in the view were touched with chinese white, and this colour, being afterwards scraped off, left every letter, dot, or flaw on the two surfaces clear on the photograph.

the crystal prism, gold flowers, &c., on the east. The globular casket is $4\frac{1}{2}$ inches in diameter and height (fig. 7). The lid fits loosely on a groove in the lower portion. The inner cavity is cylindrical, and inside it stood a cylindrical crystal phial $2\frac{1}{2}$ inches in diameter by $1\frac{1}{4}$ inches in height (figs. 11 and 12). Its position in the globular stone casket is shown on figure 7. It is moulded on the sides, flat on the top and bottom and has its lid fitted in the same manner as the small receptacle which encloses it. Inside is a flat piece of bone, $\frac{1}{2}$ inch broad; it is smooth on the one side and celled on the other; its position in the crystal casket is shown on figure 12. The method of preserving the relic with the triple casket has perfectly served its purpose, for, though there were dust and earth in the two stone caskets, there was scarcely a speck in the crystal one. Inside the globular stone casket and lying below the crystal phial were nine small flowers of various sizes in gold leaf; one of the largest is shown on figure 8. Six hollow gold beads over $\frac{1}{8}$ inch in diameter (fig. 9), and eight smaller. Four small flowers in thin copper, similar to those in gold. Nineteen small pierced pearls, and a slightly blue coloured amethyst bead (fig. 10). Fixed on the bottom by oxidation and arranged in the form of a svastika (fig. 13) were twenty-four small silver coins. They are plain on the reverse; and on the obverse have Śrî-pâḍas, triśulas, lotus flowers, and other emblems more or less legible. In the svastika, nine coins were in the centre rectangle, three on each of the four arms, and the other three (fig. 14) over the centre. The flowers and beads seem also to have been originally arranged symmetrically. An example of this symbolical use of the svastika was found in the centre of the largest of the stûpas at Pedda Gañjâm.

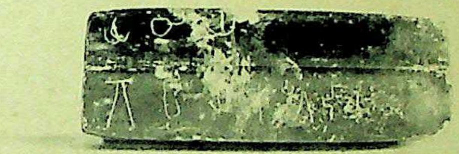
PRINCIPAL RELICS FROM FIRST CASKET.



THREE VIEWS OF INSCRIBED HEXAGONAL CRYSTAL, SHEWING THE SIX INSCRIBED FACES.

1.

2.



3.

etching.

Survey of India Offices, Calcutta, December

CHAPTER VI.

SECOND CASKET.

The bricks in the shaft were removed for a further depth of 2 feet 6 inches below level of the surface of the lid of the casket just described, or 17 feet in all from the t the shaft, when another black stone was found on the north side of the well, and, like first, sunk a foot into the side wall. It was the lid, and another stone which lay belo the receptacle of a second stone casket. The covering stone (pl. III, fig. 4) is rou triangular in form with rounded corners, and measures about 2' 3" × 2' × 10". On the is a circle 7½ inches in diameter, raised ⅛ inch above the surface. The under sid smooth and has a circular space ¼ inch deep and 12 inches in diameter. In this is an inscription in 13 lines, while around it is another in two lines; the letters were filled in with white. The stone receptacle (fig. 5) is roughly rectangular, with roun corners, and measures 1' 8" × 1' 4" × 12". On its upper surface is a circular hole inches deep, 7½ inches in diameter at the top and 4 inches at the bottom. Around th is a raised rim 1¼ inches broad, which fits into the hollow in the lid. Around and outs the rim is an inscription in two lines. These letters also are filled in with white. cavity was nearly filled with earth, and had no inner stone casket as with the first. I was a crystal phial (pl. VI, fig. 1) 1⅝ inches in diameter by 2⅜ inches high. Its lid moulded like a dagoba. The hollow in the vessel is cylindrical. The top and bottom w lying separate and filled with earth. There was no sign of a relic inside. The followi articles were found among the earth in the stone cavity:—164 gold flowers of varying si such as are illustrated in figures 2 to 6; some are plain and others have dots around t petals; they have six, eight and nine petals, and some have been fitted inside each oth with a gold bead as a bud (fig. 11). Two circular flowers (figs. 7 and 8); a two-arm figure (fig. 9), and two trisulas (figs. 10 and 12). All these are in gold leaf or thin shee of gold. Two gold stems for flowers, one of them attached (fig. 14). Six hollow go beads (fig. 15), and a small coiled gold ring (fig. 13). Two pearls, a garnet, six coral bea (figs. 19, 20 and 21), and a bit of the same material. A slightly blue flat oval crystal bea and a pointed oval white crystal bead (fig. 17). Two flat six sided chrysolite or bery drops (figs. 16 and 18). There were a number of bits of corroded copper leaf, including flowers, stems, and a miniature umbrella. The remains of a small silver Sasanam. Th metal of this is very thin, almost completely corroded, and in consequence extremely brittle so that it seems uncertain whether it will be possible to unfold it. It has been a long strip of metal 1⅞ inches broad, wound in a roll to about eight thicknesses and pressed flat (fig. 22). Three lines of letters have been pricked on the side folded inwards. The largest piece is 3 inches in length. At first it was covered with green corrosion, doubtless due to its lying among the pieces of copper; but on a partial cleaning, the white metal appeared.

CHAPTER VI.

SECOND CASKET.

The bricks in the shaft were removed for a further depth of 2 feet 6 inches below the level of the surface of the lid of the casket just described, or 17 feet in all from the top of the shaft, when another black stone was found on the north side of the well, and, like the first, sunk a foot into the side wall. It was the lid, and, another stone which lay below it, the receptacle of a second relic casket. The covering stone (pl. III, fig. 4) is roughly triangular in form with rounded corners, and measures about 2′ 3″ × 2′ × 10″. On the top is a circle 7½ inches in diameter, raised ½ inch above the surface. The under side is smooth and has a circular space ½ inch deep and 12 inches in diameter. In this circle is an inscription in 19 lines, while around it is another in two lines: the letters were all filled in with white. The stone receptacle (fig. 3) is roughly rectangular, with rounded corners, and measures 1′ 8″ × 1′ 4″ × 12″. On its upper surface is a circular hole 6¼ inches deep, 7½ inches in diameter at the top and 4 inches at the bottom. Around the top is a raised rim, 1½ inches broad, which fits into the hollow in the lid. Around and outside the rim is an inscription in two lines. These letters also are filled in with white. The cavity was nearly filled with earth, and had no inner stone casket as with the first. In it was a crystal phial (pl. VI, fig. 1) 1⅝ inches in diameter by 2¾ inches high. Its lid is moulded like a dâgoba. The hollow in the vessel is cylindrical. The top and bottom were lying separate and filled with earth. There was no sign of a relic inside. The following articles were found among the earth in the stone cavity:—164 gold flowers of varying sizes such as are illustrated in figures 2 to 6; some are plain and others have dots around the petals; they have six, eight and nine petals, and some have been fitted inside each other with a gold bead as a bud (fig. 11). Two circular flowers (figs. 7 and 8); a two-armed figure (fig. 9), and two trinacrias (figs. 10 and 12). All these are in gold leaf or thin sheets of gold. Two gold stems for flowers, one of them attached (fig. 14). Six hollow gold beads (fig. 15), and a small coiled gold ring (fig. 13). Two pearls, a garnet, six coral beads (figs. 19, 20 and 21), and a bit of the same material. A slightly blue flat oval crystal bead and a pointed oval white crystal bead (fig. 17). Two flat six-sided chrysolite or beryl drops (figs. 16 and 18). There were a number of bits of corroded copper leaf, including flowers, stems, and a miniature umbrella. The remains of a small silver Śasanam. The metal of this is very thin, almost completely corroded, and in consequence extremely brittle, so that it seems uncertain whether it will be possible to unfold it. It has been a long strip of metal 1⅜ inches broad, wound in a roll to about eight thicknesses and pressed flat (fig. 22). Three lines of letters have been pricked on the side folded inwards. The largest piece is 2 inches in length. At first, it was covered with green corrosion, doubtless due to its lying among the pieces of copper; but on a partial cleaning, the white metal appeared.

CHAPTER VII.

THIRD CASKET.

At a depth of 18 feet from the surface, the third and last casket was found lying on the east side of the shaft. The lid is an irregular circular stone measuring about 2 feet 3 inches across by from 9 to 10 inches thick (pl. III, fig. 6). On its under surface is a circular space sunk $\frac{1}{2}$ inch, having an inscription in eight lines, with letters whitened. The stone receptacle which it covered is roughly square in shape, and measures 2′ 5″ × 2′ 3″ × 11″ (fig. 5). On the upper surface is a circular cavity $5\frac{3}{4}$ inches deep, $7\frac{1}{2}$ inches in its upper diameter, and 5 inches at the bottom. Around it is a rim $2\frac{1}{4}$ inches broad, which fits into the hollow in the lid. Outside the rim is a circular inscription in one line, with letters whitened. The cavity was nearly filled with earth. In it were a crystal phial of the shape of that found in the second casket, but slightly larger (pl. VI, fig. 23). The hollow in this vessel is cup-shaped. The phial is $2\frac{1}{8}$ inches in diameter by 3 inches high. The two pieces lay apart and were filled with earth. Close to the phial lay a miniature relic casket made of a beryl (figs. 24, 25 and 26). Thus, as with the first casket, this had a triple receptacle, and owing to this the relics were found intact in the innermost one. They are three small pieces of bone. The beryl casket had originally stood inside the phial, as shown in figure 23. A cylindrical hole, $\frac{9}{32}$ inch in diameter, is drilled in its axis, in which are the relics. The hole is closed by a small white crystal stopper with hexagonal top, with a sheet of gold leaf fixed on to it. A loose sheet of the same material closes the joint at the necking, and another is placed outside on the bottom. The total height of the casket is ·75 inch.

Two amethyst beads (figs. 30 and 31) and a yellow crystal bead. A small hexagonal crystal drop of a slightly yellow colour (fig. 32), and another flat one of white crystal (fig. 29), a bone bead (fig. 33).

Six pearls and thirty-two seed pearls, all pierced. Thirty flowers, similar to those above described, a bent two-armed figure (fig. 27), and a quatre-foil (fig. 28), all in gold leaf. A piece of what appears to be silicate; an apparently iron cinder; and a few bits of copper.

The bricks were removed from the shaft, down to the foundations, which were found to be 23 feet from the summit of the mound. The brickwork in the centre is thus 3 feet below the level of the brick flooring which surrounds the stûpa.

EXAMPLES OF THE RELICS IN SECOND AND THIRD CASKETS.

Fig. 1. Crystal Phial.

Fig. 23. Crystal Phial.

CHAPTER VIII.

EXCAVATION AROUND THE BUILDING.

To ascertain what size the building had been, and whether any marbles yet remained, some trenches were dug at points around the exterior of the brickwork. The brick basement, or raised procession-path at the south-east quadrant, was found unbroken; but no marble slabs remain against it. The unbroken face of the dome also, at this point, remains intact for a height of over 5 feet above it. A section is shown on plate II, figure 3. The radius, from the centre of the building to this remaining portion of the wall of the dome, is 66 feet, making its diameter 132 feet; and, as the breadth of the surrounding basement is 8 feet, its diameter is thus 148 feet. For comparison as to size, it may be mentioned, that the base of the Amarâvati stûpa was about 138 feet in diameter.[1] Outside the raised basement, and eight feet below the surface, is a brick floor, on the outer edge of which, would once stand the marble rail, but the only remains of it were some traces of brickwork and chips of marble.

At the position of the north-east quadrant, the brick flooring between the basement and the rail remains. The basement itself has been removed, and a considerable portion of the brickwork of the dome inside the line of it. The mound which covers the remains of the central building is surrounded by another ring of mound on every side except the east. This outer ring is the earth thrown up during some of the previous excavations. On the north side, two parallel trenches were carried outwards from the position of the basement through this outer bank. These trenches were then connected by a cross cut. At this point some courses of the basement and of the north projection remain in position. I found here two pieces of a marble umbrella having a curve with a radius of 1 foot 6 inches (pl. VII, figs. 1 and 2); a small piece of a pilaster base from a slab (fig. 3); a pilaster capital with horses and riders (pl. VIII), and the half of what has been a large slab carved with the lower portion of a draped figure (pl. IX). The figure panel is checked on one side with a pilaster up its edge; and the portion of the drapery that remains, is but slightly raised from the surface. The carving is in the same archaic style as in those from the stûpas at Jaggayyapêṭa and Garikapâḍ. At a distance of 8 feet 4 inches from the basement, I found the remains of six marble bases of the rail standing in position (pl. II, fig. 5). They measure 1 foot 11 inches by 12 inches, by 1 foot 10 inches in height, above ground; with a space between each of 1 foot 7 inches. Some of them have a portion of the lower disc-shaped socket hole for the rail panel. They are sunk 1 foot 6 inches below the brick floor; and rest on a broad slab of marble laid longitudinally below them (fig. 4). Outside is a low brick wall. The ground was opened up for a few feet around these, but none others were seen there, nor any of the large panels which would surmount the rail. Similar trenches were dug on the west side, but though some courses of the basement remain, and several small plain slabs, splayed on one edge, were found outside it, no trace of the rail appeared. On the south, digging could not be carried out, on account of the proximity of a tank. Two octagonal piers, and a block of marble lie on the position of the north-east quadrant of the rail. The two former are illustrated on plate X, figures 1 and 2. Some small saucer-shaped earthenware

[1] Burgess: *Amar. and Jagg. Stûpas*, p. 21.

lamps, exactly similar to some found at Nâgalapalle, were dug out of the north trenches (pl. VII, figs. 4 and 5).

The space between the rail piers is about half that of Amarâvati, and I think the panels can hardly have been carved like those from that stûpa. They have probably been of plain lenticular shape, like those at Sâñchi. It is difficult to believe that all the large top-panels,—which would be sculptured—have gone: some must surely be lying under the earth bank outside the position of the rail.

That the basement wall panels, and not those of the rail, were the marbles removed and broken up for use on the canal, seems certain. An old maistri, and others who removed these stones, stated that the slabs were plain and about 4 feet square, standing with their tops about a yard underground. They had been removed from all around the wall. On seeing the portion of the south-east basement uncovered, the men recognized it as the position these slabs had occupied. These particulars agree with the depth of the basement underground, and the size of the slab now found. The portion of the rail, also, uncovered, shows that such slabs could not have been used in its construction. Everything would seem to point to a similarity of design and arrangement of the basement wall panels of this stûpa, and those at the two places named. Thus only the panels at the four cardinal projections of the basement would be sculptured. The line of slabs which surrounded, and which were removed from the face of the basement, would be plain, with the exception of a pilaster up one edge of each.

BHAṬṬIPRÔḶÛ.

Fig. 1.

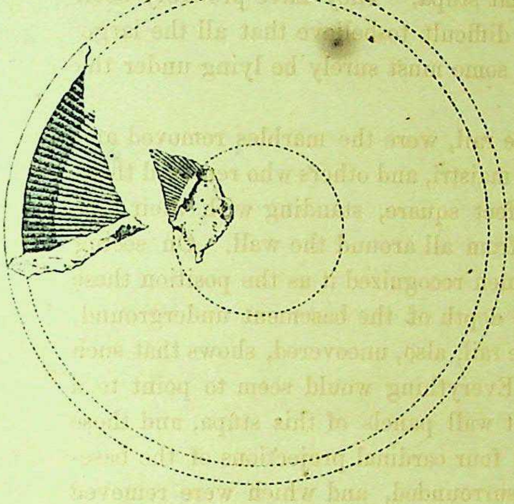
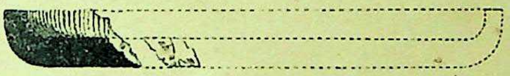


Fig. 3.

Scale of 12' 9' 6' 3'

Scale for Fig. 3.

Fig. 2.

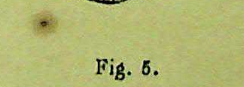


Scale of 12' 9' 6 3' 1' 2 Feet.

Scale for Figs. 1 and 2.

Fig. 4.

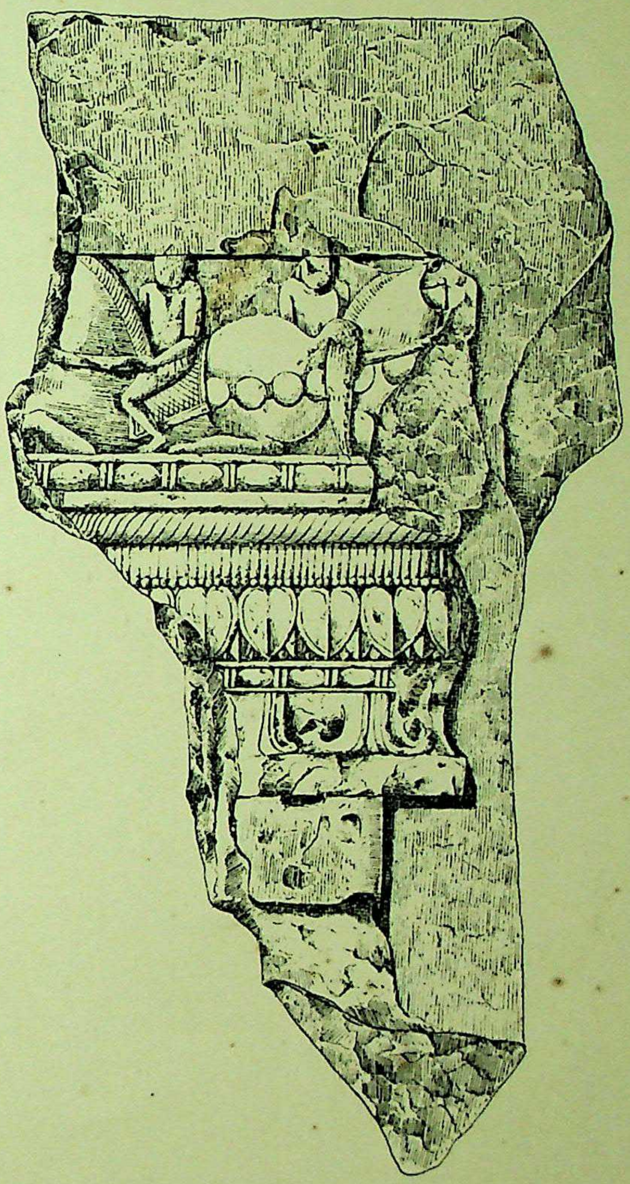
Fig. 5.



Scale of 1 2 3 Inches.

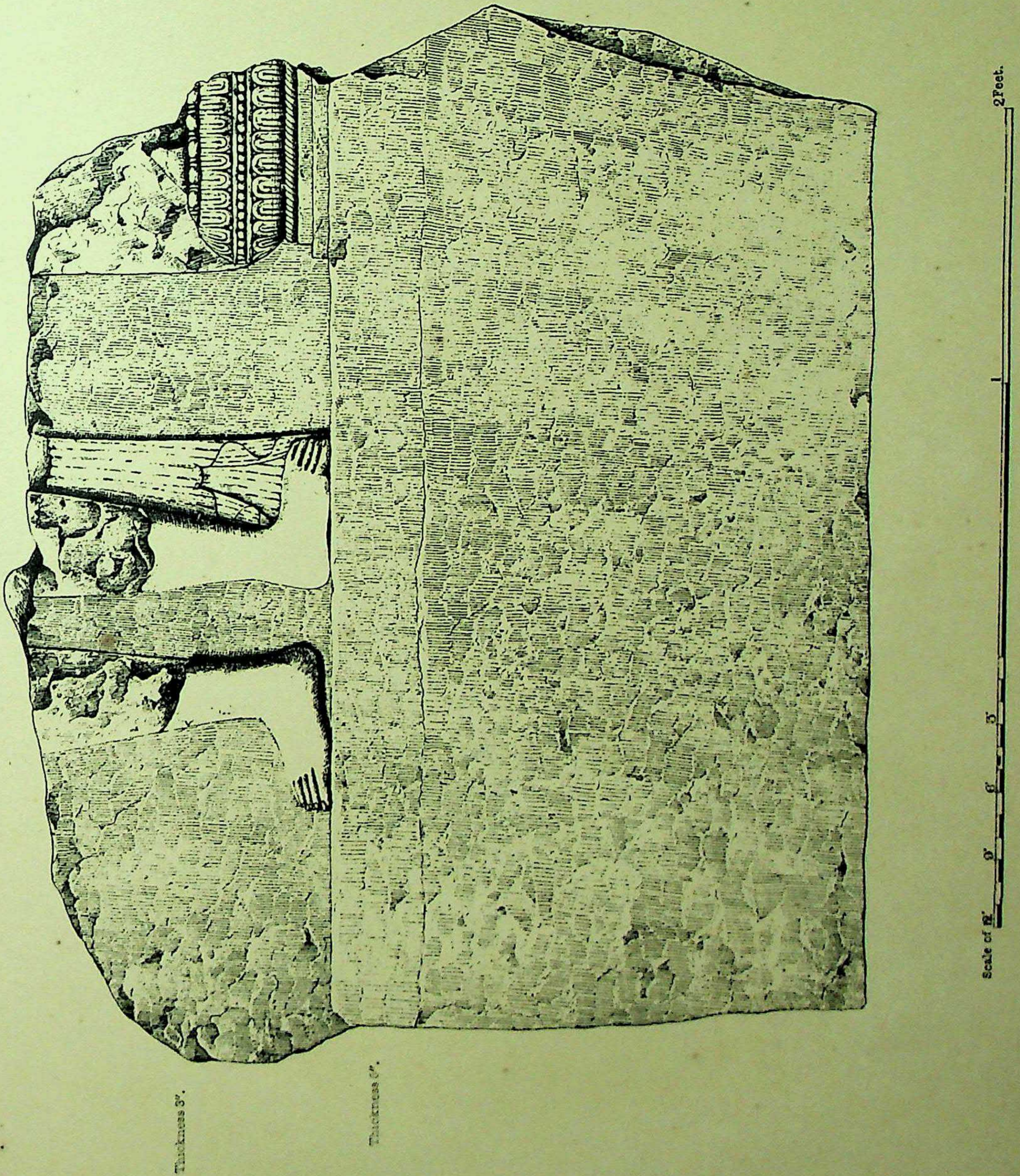
Scale for Figs. 4 and 5.

MARBLE CAPITAL OF THE PILÂSTER OF A CASING SLAB.



Scale of 12" 9" 6" 3" 1 Ft.

BHAṬṬIPRÔḶU.

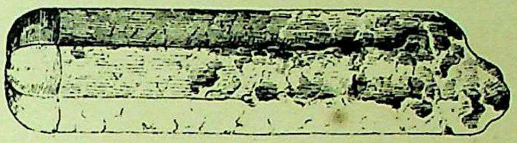


Lower Portion of Slab from North Projection of Basement.

BHAṬṬIPRÔḶU.

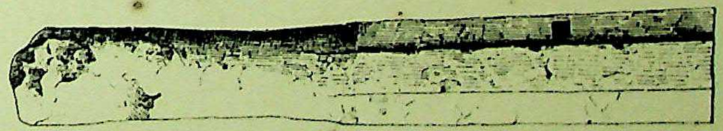
Marble Piers.

Fig. 1.

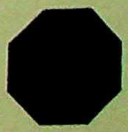


Plan.

Fig. 2.



Plan.

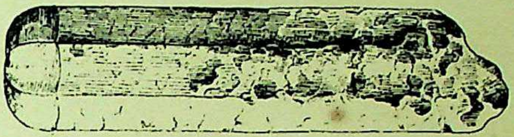


Scale of 12' 6' 0 1 2' 3 4 5 6 7 8 9' 10 11 Feet.

BHAṬṬIPRÔḶU.

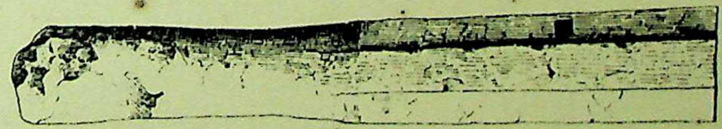
Marble Piers.

Fig. 1.

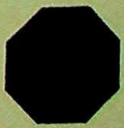


Plan.

Fig. 2.



Plan.



CHAPTER IX.

REMAINS NEAR BHAṬṬIPRÔḶU. CHINNA-LAÑJA DIBBA.

Immediàtely on the east of the stûpa is the camping tope. It is a slightly-raised piece of ground known as Chinna-Lañja dibba. From the name, and the presence of bricks in the soil, it has probably been the site of a Buddhist building. A legend is current to the effect that a dancing girl had her residence here; the large mound was the temple where she worshipped. There is also a story of a "treasure" having been found many years ago at some spot in it, and a stone box or casket, similar to those recently taken from the centre of the large stûpa.

VIKRAMÂRKA KÔṬA DIBBA.

On the east outskirts of the village is a piece of ground under cultivation, and planted with mimosa trees. It is known by the above name, and is said to have been the site of the fort of the king who ruled here. A long low mound—one of the walls of the fort—can be traced for some distance. It is said that large bricks were found, while it was being dug into some "thirty years ago."

CHAPTER X.

THE STÛPA AT GUḌIVÂḌA.

This town is the taluk head-quarters, and stands twenty miles north-west of Masulipatam. The remains of the demolished Buddhist stûpa stand in a low mound in the village. The ground measures about 140 feet square. On the west and south are roads, and on the two other sides, house yards enclosed by mud walls, built on the slope of the mound. The mound is very much smaller than the one at Amarâvati, the slope of which extends for a very considerable distance beyond the outside limits of the building.

The existence of a stûpa at this place, was first brought to notice by Mr. Boswell in a report to the Government of Madras in 1870.[1] He states that "at Guḍivâḍa there is a circular mound resembling the one at Amarâvati. It is known as *lanja dibba* or harlot's mound. It is reported to have been raised by a dancing girl who lived on the top, and confined herself to one meal a day, of which she delayed to partake till she could see the lights of Akarepally Pagoda. The mound, however, evidently covers the ruins of a Buddhist dagoba. Well burnt bricks are found in large quantities. As there is no stone available in this neighbourhood, sculptures probably do not exist, but the people tell of a stone-casket dug up here containing a pearl, some gold leaf, and other relics. There are said to have been formerly ninety-nine Buddhist or Jain temples here and ninety-nine tanks." In a subsequent report,[2] Mr. Boswell makes reference to the stûpa having been excavated to provide bricks for road-making. In the orders by Government on the two above-quoted reports, instructions were issued for the protection of this and other Buddhist monuments in the district.

The locality was afterwards visited by Mr. Sewell, who concluded, from the appearance of the mound, that it was a brick-made tope of about the same dimensions as that at Sâñchi.[3] No trace could be found of any sculptures or rails as at Sâñchi and Amarâvati.

Mr. Sewell considered it possible that, in the absence of stone, the rail might have been made of brick or wood, and in consequence have been completely destroyed. It seems more probable, however, that, if a rail really existed, it would, as has been the case in every instance of the discovery of traces of one in a South Indian stûpa, be constructed of marble. In the majority of stûpas, some trace of marble construction has been found, though the material does not exist in the locality, and must have been conveyed for long distances, probably from the Palnâd, where the stone exists.[4] Dr. Burgess found, that the stone used in the Jaggayyapêṭa stûpa had been quarried on the bank of the Krishṇa, immediately to the south of that place; and that the same stone must have been used at Amarâvati.[5]

Mr. Sewell obtained from a subordinate of the Public Works Department the following description of the discoveries made in the mound when in progress of demolition. He states that "four stone receptacles were found at the four corners, each measuring about two feet by one foot six inches, formed by the erection, on one stone as a base, of four stones placed on their edge, with a covering slab. Inside each was a casket, but I could not

[1] G.O., No. 1725, of 7th November 1870.
[2] G.O., No. 2108, of 14th December 1871.
[3] Report in G.O., No. 1620, of 1st November 1878, p. 32.
[4] *Kistna District Manual*, p. 151.
[5] *Amar. and Jagg. Stûpas*, p. 107.

ascertain what material they consisted of, nor what they contained, nor can I ascertain what has become of them." In a letter from Sir Walter Elliot, published by the Madras Government,[1] the following reference occurs: About 1840, a mound of brickwork was demolished to obtain material for repairing the high road between Bezvâḍa and Bandar, and in it were found "four stone-vases, each containing a crystal reliquary, not deposited in the centre of the mound as at Dipal-dinna (Amarâvati) but in the four sides." . . . . "A similar deposit was found some years ago by the Zemindar of Pittapoor in the Rajahmundry district. The four stone-vases, each containing a crystal box, were seen by Sir Henry Montgomery in 1843, who induced the Rajah to send them to the Government Museum, where they now are. They were figured in the *Madras Journal of Literature and Science*, Vol. XV, and plate 2, but without any description, *Madras Journal*, Vol. XIX, p. 225." These stone boxes have since been figured and described by Dr. Burgess.[2] Four small crystal caskets, which seem to be those above referred to, have just (1892) been found in the Madras Museum. They are similar in shape, but smaller than the first crystal casket from Bhaṭṭiprôḷu. A slight difference is seen in their each having a small knob in the centre of the top of the lid. The description of the construction of the Guḍivâḍa caskets tallies with that of the casket found in the upper part of the Bhaṭṭiprôḷu stûpa, when it was being demolished: it also was made up of stone slabs. In the notes of the finding of these four caskets, it is uncertain which "four corners" are referred to, for it must be remembered the building is a circular one. The account does not state whether around or near the centre, or the circumference. They may have occupied positions similar to the lower ones at Bhaṭṭiprôḷu. From enquiries on the spot, one at least appears to have been found high up in the centre of the brick mound.

Though all traces of marble sculptures, or rail, had been removed from the surface, it was possible that some of them might remain underground, as at Amarâvti and elsewhere. This could only be ascertained by digging. Owing to the confined nature of the ground, there was very little room for trenches, and no digging could be done outside the limits of the mound; but at different points, on the west, north, and east sides, I had three trenches sunk on the boundaries of the ground. These showed that the foundations were three feet below the level of the roads; and the brickwork remained for a height of from nine to eleven feet at the highest parts. The walls stand close up to the boundaries, but as the faces are rough, it is impossible to ascertain how much further out the unbroken walls may have extended. The exact size of the stûpa cannot thus be known. Traces of circular courses of brickwork appear on the mound, and a very slight scraping of the earth, which has accumulated over it, shows that it is solid up to the centre. In this respect, its construction has been similar to that at Bhaṭṭiprôḷu.

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[1] Proceedings of 7th June 1871, No. 1000.

[2] *Amar. and Jagg. Stûpas*, p. 99, pl. LIII.

CHAPTER XI.

SITE OF THE ANCIENT VILLAGE.

On the west outskirts of the town, the ground slopes upwards to an extensive mound now under cultivation. It is known as Lâmapâḍu dibba, and is the site of the fort, which enclosed the ancient village, with its traditionary ninety-nine Buddhist temples and tanks. Long low ridges of earth, each about a quarter of a mile in length, can be indistinctly traced; these form a large square, and mark the position of the walls of the fort. It is said to have been a place of importance in the transport of grain between Bezvâḍa and Ellûr.

Bricks and broken pottery are scattered about the ground; and small articles of interest are found when the earth is turned up, or after rain. The soil is composed of mud, the washed-down material of which the houses were built; it is largely used for brick-making. Regarding the objects found here, Mr. Sewell states,[1] "I have found there a large number "of coins, beads, and other small articles. A few of the coins have proved valuable. General "Cunningham, to whom I sent them, has made out the inscriptions on three of them, and "finds them to be coins of the Andhra kings *Gôtamiputra*, *Yâdnya Srî*, and *Srî Chanda*. "They bear well known Andhra dynasty devices. Another very interesting coin (I was in "possession of three, struck from different dies, but of the same design) bore the figure of "a Roman or Greek galley, with a rather crescent-shaped hull, two masts, and a large "oar-shaped rudder. All of the coins found were made of lead, and most of them were so des- "troyed as to have their devices quite undecipherable. I found also, very well preserved, the "terra-cotta head of a female, with braided hair caught up in a knot at the back, and fastened "round, apparently, with an ornamental metal band. The beads are made of hardened mud, "burnt clay, bone, crystal, glass, amber, and stones of various sorts including many garnets. "The beads are of very varied shapes and sizes, and many of them are of beautiful workman- "ship, notably those in stone. I found also several other small articles amongst the gravel, a "small portion of a crystal jar, one or two pieces of broken bone armlets, one or two small "polished stones, apparently fragments of burnishers, and other such like remains;—the whole "proving conclusively that the men of that day were highly experienced lapidaries. As to "the pottery, some of the broken fragments show that it was of a class vastly superior to that "of the present day—a fact which I apprehend there is little or no dispute about. The mouths "of some of the pots must have been three or four feet in diameter, and the pots themselves "must have been of very large size, and probably used for grain receptacles. Some are grace- "fully ornamented."

In the courtyard of the temple of Bhîmêśvara is a fine Jaina image (pl. XI). It is now claimed by the Brahmans, and worshipped as Munêśvarasvâmi. The figure is a seated one, and is carved on a black stone slab. The ear lobes are pierced and distended. The hair is curled. Over the head is a seven-headed nâga, and a triple umbrella. In plate XXXV is illustrated a curious monolithic sculptured Jaina column, lately unearthed by some excavators from under the foundations of a house at Bezvâḍa.

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[1] *Report, ibid.*, p. 33.

GUḌIVÂḌA.

JAINA IMAGE.

CHAPTER XII.

ANDHRA COINS FROM GUḌIVÂḌA

Plates XII and XIII.

These coins were found scattered in the earth on the site of the ancient village. They are seventy-two in number, and represent the best of a lot of one hundred and twenty which I secured during my visit. The whole of them are lead, and were all at first more or less covered with oxidation. Some of them, especially the smaller ones, at first appeared quite devoid of either device or inscription, so thick was the oxidised coating; but after being cleaned, these were generally found to have the most perfect devices preserved underneath. It will be apparent, therefore, that none of this kind of coin should be passed over as worthless, till an attempt has been made at cleaning. With a soft material like lead, some care is required in removing the deposit, so that the letters or emblems on the coin may not be injured. With some coins, the oxidation is so obstinate, that it is impossible to completely remove it, but in most cases it can be entirely taken off, or sufficiently so, to show what is underneath. Potash dissolves the salts of lead, and, I found, that soaking the coins in a solution of this material for a fortnight or three weeks, made it sufficiently soft to be easily rubbed off. During this period, the coins were regularly scraped with a quill, and, with what I afterwards found to be more effective, a stalk of the *calotropis gigantea* (எருக்கும்செடி-erukkumcheḍi, Tam.). The stalks are soft and fibrous, and rubbing with them does not scratch the coin. The alkali which they contain, also, doubtless has its effect in removing the deposit from the lead.

As to the method by which the device was impressed on these leaden coins, Thomas states[1] that "the larger coins were obviously, in many cases, *cast*, but lead was alike so "soft in itself, and so readily made softer by heat, that we should be wrong to pronounce any "final opinion upon the actual methods of manipulation, which seem, however, to have "admitted of a superimposed, or otherwise, as it is *technically* termed, superstruck, secondary "impression. Whether this was effected by mere re-heating and the pressure of a hard clay "mould upon the surface of the original casting, it would be hard to say," . . . "That "mechanical *striking*, or the complete formation of a coin of two dies, was in vogue at this "coincident period, is proved by the smaller copper coins bearing the same legends and "devices as the leaden pieces, which, however, come out far more distinctly in their devices, "and sharper and more definite in their legends than the associate coins of the other metal. "The Śiṁha coins" . . . . . "furnish us with unusually definite examples of a practice "common in the early mintages of Southern India of designedly leaving the lower surface of "the piece *blank*. In these instances, the *lead* has seemingly been poured out, in a fluid "state, from a heated ladle, on to flat surfaces of stone or even wood, and then sealed with "the impress of the single authorized die." If moulds were used in casting these coins, they could not have been in the form usually understood by the term, that is, they could not have been sunk to a depth equal to the thickness of the coin, else we should invariably have found the device completely on and in the centre of the coin; but very seldom is it so. The outline

[1] *Ind. Antiq.*, vol. IX, p. 64.

of the coin also, would have taken a more regular form in the shape of the mould. In none of the coins obviously intended to be round, is a perfect circle seen. Some are of very irregular shape, while others have a protuberance on one side, as if the metal had been molten and oozed out on the one side on pressure being made by the upper die. The engraving, therefore, whether used as a mould, on to which the metal was poured and allowed to cool, or into whose shape it was forced, could only have had an impression of the device without an enclosing trough. The die used for the obverse, is usually of a size approaching to, though occasionally slightly larger than that of the coin. The case is different with the reverse, where large and small devices seem to have been used indiscriminately without reference to the size of the coin, or to the position the engraving on the reverse die occupies with the device on the obverse.

As to the question of the Śiṁha coins furnishing examples of the practice of leaving the reverse blank, the present specimens would seem to indicate that the absence of a device may in certain cases at least, be due to the coins being large and heavy, and that the device being raised in thin lines on a flat surface, had been worn off, while the coin was in use. Some of the larger horse coins have the reverse plain, apparently for the same reason. Three of the Śiṁha coins, for instance (Nos. 46, 47, and 50), yet retain traces of the Ujjain symbol. Another of these coins (No. 45) shows a *sunk* device, evidently *struck* with a punch.

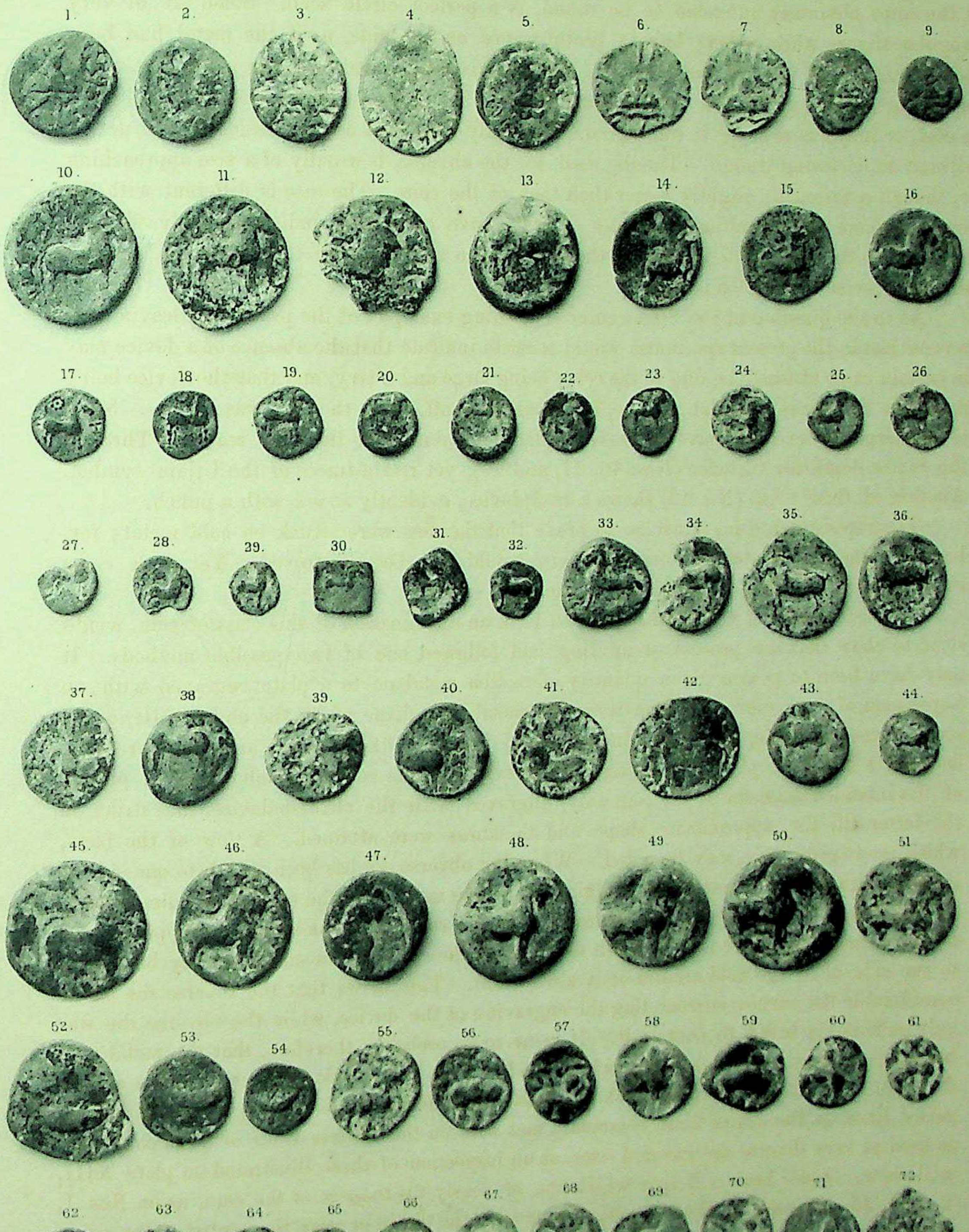
The superstruck coins must go to prove that the dies were struck on cold metal; for, had the coins been heated, the original device would have been destroyed. Yet these coins retain both the original and secondary devices.

A consideration of what can be learned from an examination of this class of coin would seem to show that the process of minting, had followed one of two possible methods. It may have been to pour a given quantity of molten metal on to a plate engraved with an impression of the reverse and then press the metal into shape whith the obverse die, or, as seems more probable, to place a lump of cold metal of fixed weight and globular form, between a broad die plate containing an engraving of the reverse symbol, and a punch, of the intended diameter of the coin only, engraved with the obverse device, and strike on the latter till the approximate shape and thickness were attained. A few of the facts, which go to prove this, may be noted. When the obverse die has been struck to one side, a lumpy irregular rim caused by the bulging out of the metal over the edge of the die, appears on the other (see Nos. 40, 47, 57, &c.). On the reverse, no such rim ever appears, and however small the device may be with reference to the coin or, how much it may be placed to one side of it, the field around it is always flat. This shows that the reverse die had a considerable flat surface surrounding the engraving of the device, while the obverse die was only sufficiently broad to contain it. It seems more probable, therefore, that the metal may have been laid or poured on a somewhat *broad* surface, and struck or pressed with a *narrow* die than that the reverse process should have taken place. The Ujjain symbol, always in raised lines, is the device most commonly met with on the reverse sides of these coins. It is used in very diverse designs and sizes, as an inspection of those illustrated on plate XIII, will show. Some have a design which fits, or nearly fits the size of the coin, as on Nos. 1, 2, 5, 6, 35, 37, and 46, but in very few cases is the die in or near the centre of the coin; usually only a protion of the symbol appears. In others, the symbol is of a size slightly, or much larger than the coins on which it is used, as in Nos. 7, 13, 55 to 61, and 65 to 68. The obverse, on the other hand, is usually of a size to suit the coin, though it may not always appear in the centre of it. Sometimes again, a small symbol is struck on a large coin as in No. 52 or on a small coin as Nos. 8 and 17. As to the variations in the design of

ANDHRA COINS FROM GUDIVÂDA.

OBVERSE TYPES.

PLATE XII.



Survey of India Offices, Calcutta, September 1893

Photo-etching.

FULL SCALE.

ANDHRA COINS FROM GUDIVÂDA.

REVERSE TYPES.

PLATE XIII

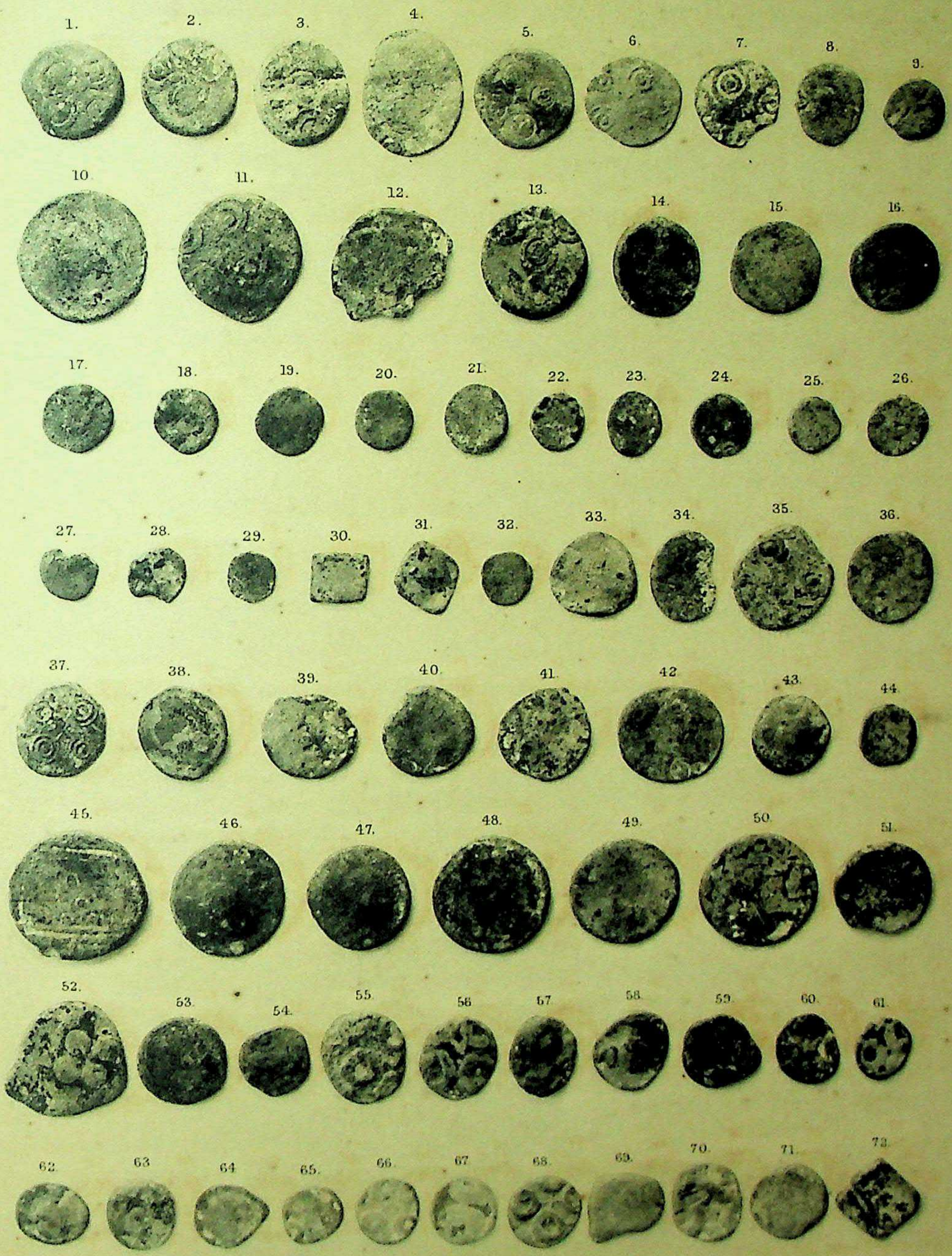


Photo-etching

Survey of India Offices, Calcutta, November 1893.

FULL SCALE.

the symbol, Nos. 1 to 5, 7, 13 and 37, though of different sizes, show one class with a dot in the centre, and two thin-lined circles surrounding it. No. 6 has the same figure, but the outer circle terminates in two prongs at the extremity of the arms. This, however, may perhaps be due to the coin having been bruised, or worn at that particular place. Other types are those in Nos. 8, 10, 11, 35, and 46, which have one broad lined circle around the dot. Solid circles appear on Nos. 52 and 53, but they may not originally have been so. Another class, as in Nos. 55, 56, 57, 60, 61, 65, 66, and 68, have no central dot, but only the central crossed lines prolonged into the centre of the circles. This feature is most distinct on No. 68. The broad lined symbols are of more archaic design than those of thin lines, and being found only on the more crudely stamped coins, would mark them of older date than the others. The coin last referred to (No. 68) also, has traces of other crossed lines, not at right angles, joining the outer segments of the circles, as if the die had been a large one with more than one series of four circles joined together by crossed lines, perhaps for impressing more than one coin at a time. On No. 55, for instance, there are traces of what appear six circles, and No. 63 has a lattice-work arrangement of lines with small circles at some of the intersections. No. 13 is a very distinct device, with a half moon fixed on the outer extremity of the one complete circle which shows on the coin. No. 17 also, has the half-moon, of the same radius as the circle to which it is attached. Some reverses, now apparently plain, or, nearly so, have before had devices stamped on them; thus on figures 10, 11, 12, 47, 50, &c., indistinct traces of the symbol appear. No. 45 has an unusual device, being a square of three sunk lines on each face, enclosing a number of dots and semi-circles. No. 70 has a curious device, the precise meaning of the design of which, it is difficult to discover. A number of the coins have inscriptions, but they are usually much worn and defaced, with only a few of the letters legible. Generally, only a part of the legend appears on one coin. The full inscription may sometimes be obtained by comparing several of the one kind.

In plates XII and XIII the coins have been arranged into a typical series according to the leading device they bear on the obverse. With only a comparatively small number of the coins inscribed; and even these, with only a few of the letters of the legend discernible, it would be unsatisfactory to attempt to arrange them otherwise. The former plate shows the obverse and the latter the reverse of the coins, in each case under the same number. Nos. 1 to 9 are chaitya coins, only one (No. 1) of which has the surmounting half-moon. Nos. 10 to 44 have the horse, either facing right or left. They are usually very sharply cut, especially some of the small coins, which have retained their clearness better than those of larger size. Nos. 45 to 51 are Śiṁha coins, all with the statant lion facing the right. Three varieties of the ship are shown on figures 52 to 54. The remainder are miscellaneous coins, generally of crude execution. It is sometimes difficult to discern exactly what animal some of these are intended to represent, but the principal device among them seems to be the elephant.

Chaitya Coins.

No. 1. Lead. Round. Weight 74 grains.

Obverse.—Device slightly to left. Chaitya with three rows of inverted semi-circles surmounted by a half-moon. Below the pedestal a serpent in a wavy line.

Legend.—तमांपुतससरय.

tami-putasa saraya.

Reverse.—An Ujjain symbol of the same diameter as the coin. Design, dot enclosed in two circles.

No. 2. Lead. Round. Weight 68 grains.

Obverse.—Device to right. Chaitya with two rows of semi-circles, and wavy serpent at foot.

Legend.—वस.
vasa.

Reverse.—Ujjain symbol. Same die as No. 1, but three-fourths only visible on top.

No. 3. Lead. Round. Weight 68 grains. Coin crushed by a line struck through middle of device.

Obverse.—A chaitya seemingly similar to No. 2.

Legend.—स . . . पुत.
sa . . . puta.

Reverse.—Ujjain symbol as in preceding; half of device on coin.

No. 4. Lead. Round. Weight 66 grains. Coin crushed thin to an oval shape.

Obverse.—Chaitya with two rows of semi-circles, and serpent at foot.

Legend.—पुतस—सिवा.
putasa—Śivâ.

Reverse.—Ujjain symbol as in preceding, half of device on left of coin.

No. 5. Lead. Round. Weight 78 grains.

Obverse.—Two-rowed chaitya, with serpent at foot.

Legend.—वासिठोपु.
vâ si tho-pu.

Reverse.—Ujjain symbol as in preceding; entirely on coin, but struck down towards lower edge.

No. 6. Lead. Round. Weight 32 grains. A thin coin.

Obverse.—Two-rowed chaitya, with serpent at foot.

Legend.—Illegible; traces of letters visible around.

Reverse.—Ujjain symbol slightly off left. Design three thin circles round dot. Outer circle terminates in prongs.

No. 7. Lead. Round. Weight 35 grains. Small piece broken off lower left side.

Obverse.—Two-rowed chaitya, with serpent at foot.

Legend.—Illegible; traces of letters around upper half.

Reverse.—Ujjain symbol as in No. 1, but with larger circles. Design larger than coin.

No. 8. Lead. Round. Weight 22 grains. A small coin.

Obverse.—A small two-rowed chaitya, with serpent at foot.

Legend.—Illegible.

Reverse.—Small Ujjain symbol to left. Design, dot and one circle.

No. 9. Lead. Round. Weight 17 grains.

Obverse.—A small two-rowed chaitya, with serpent at foot.

Legend.—Traces visible on top.

Reverse.—Device illegible.

THE HORSE FACING RIGHT.

(Large Coins.)

No. 10. Lead. Round. Weight 120 grains. A large thick coin.

Obverse.—A boldly executed figure of a horse to the right, half-moon in the field. Rim raised, centre concave.

Legend.—सतकण.

satakana.

Reverse.—Ujjain symbol, with dot and one circle, much worn. Slightly less than coin, but struck towards right.

No. 11. Lead. Round. Weight 130 grains. A large thick coin.

Obverse.—Horse to the right, with half-moon in the field.

Legend.—सतकणस.

sataknasa.

Reverse.—Ujjain symbol as in No. 10, struck towards left.

No. 12. Lead. Round. Weight 115 grains. A fragment of a similar coin to No. 11.

Obverse.—Horse to the right, with half-moon in the field.

Legend.—गोतमिपुत.

Go tami-puta.

Reverse.—Device, the usual symbol, but nearly worn away.

No. 13. Lead. Round. Weight 122 grains. A thick coin of a slightly less diameter than those preceding.

Obverse.—A well raised horse to the right.

Reverse.—The half of an Ujjain symbol on the upper part of field. The figure, if complete, would slightly more than cover the coin. The one complete arm has two well raised circles around a central dot, with a half-moon on the outer extremity.

(Medium size Coins.)

No. 14. Lead. Round. Weight 55 grains.

Obverse.—Horse to the right. Field slightly concave.

Legend.—सिरि.

siri.

Reverse.—Faint traces of a large Ujjain symbol.

No. 15. Lead. Round. Weight 45 grains.

Obverse.—Horse to the right.

Legend.—सतस.

satasa.

Reverse.—Plain.

No. 16. Lead. Round. Weight 65 grains. A thick coin.

Obverse.—Horse to the right. Raised rim, and concave field.

Reverse.—Plain.

(*Small Coins.*)

Nos. 17, 18 and 19. Lead. Round. Weight 18, 11 and 14 grains. Three specimens of one class of coin. Thin.

Obverse.—A sharply cut figure of a horse to the right; an upright post with top and bottom cross-bars under the horse's head. A sun formed of a circle of dots surrounding a central dot, in the field.

Reverse.—Small Ujjain symbol on right, formed of a ball on the extremity of each of four crossed lines, and a semi-moon on the outer edge of the circle. Device shows clearly on No. 17, hardly visible on the others.

No. 20. Lead. Round. Weight 16 grains. A thicker coin than the three preceding.

Obverse.—Horse to the right. Portion of a rim underneath.

Reverse.—Two dots of a small Ujjain symbol visible on left.

No. 21. Lead. Round. Weight 28 grains. A similar coin to No. 20, but larger and thicker.

Nos. 22 and 23. Lead. Round. Weight of each, 11 grains.

Obverse.—Horse to the right.

Reverse.—Plain.

No. 24. Lead. Round. Weight 22 grains.

Obverse.—Horse to the right. Field slightly concave, with rim around.

Reverse.—Plain.

No. 25. Lead. Round. Weight 19 grains, similar to, but smaller than No. 24.

No. 26. Lead. Round. Weight 12 grains. Coin thin and bruised. Probably a specimen of Nos. 17, 18 and 19.

Obverse.—Horse to the right.

Reverse.—Plain.

No. 27. Lead. Round. Weight 6 grains. A fragment of a very thin coin.

Obverse and *Reverse.*—Same as the preceding.

No. 28. Lead. Round. Weight 8 grains. A very thin coin. Portion broken off lower side.

Obverse.—Horse to the right. A variant of No. 27. Difference visible in body and legs of the horse.

Reverse.—Bruised, and device indistinguishable.

No. 29. Lead. Round. Weight 4 grains. Very small and thin coin, variant of the preceding.

No. 30. Lead. Oblong. Weight 20 grains.

Obverse.—Horse to the right. Field circular concave.

Reverse.—Plain. Edges of coin slightly bevelled.

THE HORSE TO THE LEFT.

(*Small Coins.*)

No. 31. Lead. Square with rounded corners. Weight 20 grains.

Obverse.—Horse to the left, with vertical post and cross-bars in front. Circular concave field. Device struck diagonally.

Reverse.—Bruised, with slight traces of Ujjain symbol.

No. 32. Lead. Round. Weight 9 grains. Small thin coin.

Obverse.—Clearly cut figure of horse to the left.

Reverse.—Plain.

(*Medium size Coins.*)

No. 33. Lead. Round. Weight 65 grains. Coin bruised out of shape.

Obverse.—Horse to the left. Dotted sun in the field.

Legend.—Illegible traces on right top.

Reverse.—Two dots of Ujjain symbol visible.

No. 34. Lead. Oval, with piece out of left side. Weight 49 grains.

Obverse.—Well raised horse to the left, with head broken away.

Legend.—Slight traces visible at bottom.

Reverse.—Portions of Ujjain symbol with dot and two circles; device, diameter of coin.

No. 35. Lead. Round with upper left edge flattened. Weight 71 grains.

Obverse.—Horse in high relief to the left.

Reverse.—Ujjain symbol slightly larger than coin, with dot and one circle.

No. 36. Lead. Round. Weight 63 grains.

Obverse.—Horse to the left.

Legend.—तस सि.

tasa si.

Reverse.—One circle of Ujjain symbol visible.

No. 37. Lead. Flattened round. Weight 48 grains.

Obverse.—Well raised horse to the left, with hind quarters off coin. Round object over back, probably a sun.

Legend.—कणस.

kanasa.

Reverse.—Ujjain symbol of size of coin. Two thin circles around dot.

No. 38. Lead. Round. Weight 65 grains.

Obverse.—Well raised horse to the left, with head off coin.

Legend.—तमिपु.

...*tami-pu.*

Reverse.—Traces of Ujjain symbol.

No. 39. Lead. Round. Weight 49 grains. Probably a specimen of No. 37.

Obverse.—Horse to the left with sun in the field. Field much indented.

Reverse.—Device illegible.

No. 40. Lead. Round. Weight 57 grains.

Obverse.—Horse to the left, with forepart off coin. Rim on the right. Seems the same die as No. 38.

Legend.—गोतमिपु.

Go tami-pu.

Reverse.—Traces of Ujjain symbol, much worn.

No. 41. Lead. Round. Weight 34 grains. A thin and bruised coin.

Obverse.—Horse to the left, with lower quarters off coin.

Legend.— . . . तमि . . . णस.

. . . *tami* . . . *ṇasa.*

Reverse.—Device illegible.

No. 42. Lead. Oval. Weight 45 grains. A "double-struck" coin.

Obverse.—Horse to the left. A circle over the horse's head is part of the super-struck Ujjain symbol. Surface flattened.

Legend.— . . . तकणस.

. . . *takaṇasa.*

Reverse.—Bruised, and device indistinguishable. A circle appears at the foot, and traces of what may be letters through centre of coin.

No. 43. Lead. Round. Weight 40 grains.

Obverse.—A horse seemingly, facing left. Device much worn.

Reverse.—Worn and indistinct.

No. 44. Lead. Round. Weight 18 grains. A small coin.

Obverse.—A horse (?) to the left.

Reverse.—Plain.

Śiṁha Coins.

No. 45. Lead. Round. Weight 218 grains.

Obverse.—A lion facing right.

Reverse.—A square, enclosed by three *sunk* lines on each of the sides. Inside the square, three tiers of sunk semi-circles with a dot inside each, are visible. The lowest tier has three, the second two, and the upper one. These may possibly represent a chaitya, but as the rest of the surface is worn, it is impossible to see whether the square may not have been completely filled in with these semi-circles.

No. 46. Lead. Round. Weight 132 grains.

Obverse.—Lion to the right, with tail curled over its back. Field concave.

Legend—समसे.

samase.

In some śiṁha coins from Amarâvati, described by Thomas[1] the legend is given as सकसकस *sakasakasa.* In the present specimen the second letter is clearly an म. The legend is close to the edge of the coin, and the vowel marks over the स, are uncertain. Two letters

[1] *Ind. Antiq.*, vol. IX, p. 46, 1880.

follow the second स, but only the lower portion is visible. It is uncertain what they are, but they are not the terminal letters of the Amarâvati coins.

Reverse.—Ujjain symbol slightly less than coin, with dot and one circle, struck off top.

No. 47. Lead. Round. Weight 121 grains.

Obverse.—Forepart of lion to the right. Field sunk, with raised rim on right.

Legend.—Around right, illegible except letter स.

Reverse.—Faint traces of Ujjain symbol.

No. 48. Lead. Round. Weight 165 grains.

Obverse.—Lion to the right. Field slightly concave.

Reverse.—Plain.

No. 49. Lead. Round. Weight 150 grains.

Obverse.—Lion to the right, with hind quarters off coin. Field slightly concave.

Reverse.—Plain concave.

No. 50. Lead. Round. Weight 162 grains.

Obverse.—Lion to the right, with hind quarters off coin. Part of the tail appears over the back. In front is an upright line with a row of upward pointing branches on each side. A seemingly similar device has been described as consisting of triśulas,[1] but in the present case the figure more closely resembles a tree. The field is concave, and as the die has been struck to the left, a broad rim appears on the right.

Reverse.—Nearly plain, evidently been an Ujjain symbol.

No. 51. Lead. Round. Weight 81 grains.

Obverse.—A lion to the right, with tail over back. Field flat, without rim.

Reverse.—Plain.

Ship Coins.

No. 52. Lead. Irregular round, with extension on the lower right. Weight 101 grains.

Obverse.—A ship resembling the Indian dhoni, with bow to the right. The vessel is pointed in vertical section at each end. On the point of the stem is a round ball. The rudder, in the shape of a post with spoon on end, projects below. The deck is straight, and on it are two round objects from which rise two masts, each with a cross tree at the top. Traces of rigging can be faintly seen.

Legend.— ण only legible.

Reverse.—A small Ujjain symbol on the right side, consisting of four central lines with four balls at the extremities.

No. 53. Lead. Round. Weight 65 grains.

Obverse.—A ship to the right. The device resembles that described under No. 52, but the features are not quite so distinct. The deck in this specimen is curved.

Reverse.—Traces of an Ujjain symbol, of the same size and form as in No. 52.

No. 54. Lead. Round. Weight 29 grains.

Obverse.—A device similar to the preceding, showing even more distinctly than No. 52. The rigging is crossed between the masts. On the right end of the vessel appear three balls, and under the side are two spoon-shaped oars.

Reverse.—Traces of an Ujjain symbol with dot and one circle.

[1] *Ibid.*, No. 18.

Elephant and other Coins.

No. 55. Lead. Round. Weight 52 grains.

Obverse.—An animal facing the right, seemingly an elephant with trappings.

Legend.— . . . सरिवण.

. . . *sarivana.*

Reverse.—Ujjain symbol, larger than coin; central cross lines prolonged into a broad lined circle. Traces of a succession of circles visible.

No. 56. Lead. Round. Weight 41 grains.

Obverse.—Device and legend similar to No. 55.

Reverse.—Device similar to No. 55, but with portions of four circles only on coin.

No. 57. Lead. Round and thick. Weight 41 grains.

Obverse.—Device low down on the coin showing rim on the top. Evidently the same animal as on the two preceding coins.

Legend.—Same as in No. 55, but differently placed with reference to the head of the elephant.

Reverse.—Similar to No. 56, but with less of the device struck on coin.

Nos. 58 and 59. Lead. Round. Irregular. Weight 41 and 57 grains.
The former somewhat worn.

Obverse.—Elephant to the right.

Reverse.—One solid circle only of Ujjain symbol, in centre of coin No. 58, traces of four similar on No. 59.

No. 60. Lead. Round. Weight 22 grains. A small variety of No. 55. Symbol on reverse smaller than in No. 55, &c.

Nos. 61 and 62. Lead. Round. Weight, each 22 grains.

Obverse.—A crude figure of an elephant to the right.

Reverse.—Device similar to preceding.

No. 63. Lead. Round. Weight 32 grains.

Obverse.—Animal, probably an elephant facing the right.

Reverse.—Four lines crossed diagonally with an almost solid circle at two of the intersections.

No. 64. Lead. Round with projection on left. Weight 18 grains. Thin.

Obverse.—Elephant to the right.

Reverse.—Device illegible.

No. 65. Lead. Round. Weight 14 grains.

Device on obverse similar to preceding. The reverse is similar to No. 56, but smaller.

No. 66. Lead. Round. Weight 26 grains.

Obverse.—Elephant to the left.

Reverse.—Ujjain symbol larger than coin; same design but smaller than No. 56, &c.

No. 67. Lead. Round. Weight 34 grains.

Obverse.—Device uncertain, probably an elephant to the right.

Reverse.—Traces of a device similar to No. 66.

No. 68. Lead. Round. Weight 45 grains.

Obverse.—Elephant to the right.

Legend.—Illegible.

Reverse.—Similar to No. 66, but larger.

No. 69. Lead. Irregular shape. Weight 51 grains.

Obverse.—Animal to the right, probably an elephant.

Legend.—Illegible.

Reverse.—Traces of a small Ujjain symbol.

No. 70. Lead. Round. Weight 41 grains.

Obverse.—Device indistinguishable, bears a slight resemblance to No. 57.

Legend.—सिरिरु (द).

Siri Ru (da).

Reverse.—Device indistinguishable.

No. 71. Lead. Round. Weight 35 grains.

Obverse.—An animal to the right, perhaps a horse.

Legend.—Illegible.

Reverse.—Plain.

No. 72. Lead. Square. Weight 30 grains.

Obverse.—A crude representation of an animal, probably a horse, facing left. Device struck diagonally.

Reverse.—Two lines at right angles, with curved lines at the extremities.

CHAPTER XIII.

GHANṬAŚÂLÂ.

EXCAVATION AT THE STÛPA.

A village in the Tsallâpalli Zamindâri, thirteen miles west of Masulipatam.

The Buddhist mound at this place was one of those noted by Mr. Boswell in his reports to Government in 1870–71.

The mound is known as Lañja dibba; and stands in the fields on the north-east of the village. It is circular in shape, and measures about 112 feet in diameter and 23 feet in height. Brick walls and black mud appear on the surface.

The cultivated fields extend close up to, and in parts encroach on the slope of the mound. On one side, part of a palmyra palm tope grows on the lower part of it.

The excavations, recently conducted in the mound, show the remains to be those of a Buddhist stûpa, of a date probably a few years subsequent to the later works at Amarâvati. The upper part of the building is away; but the foundations, with such portions of the upper walls as extend up to the surface of the mound, remain intact. These show an arrangement of plan not hitherto met with in any of those examined in South India. (Pl. XIV, fig. 2.)[1]

The Ghaṇṭaśâlâ stûpa has a cube of solid brickwork in the centre, measuring 10 feet square. Enclosing it is a hollow chamber, measuring 19 feet square, with walls 3 feet 4 inches thick. It is connected with the central cube by a cross wall, 2 feet 4 inches thick, which runs out at right angles from each face of the latter. Outside it, is a circular wall 3 feet 6 inches thick and 55 feet 10 inches in exterior diameter. The four cross walls above referred to, are continued out to join this circle; the four walls also, of the hollow square are produced out—two from each corner—but with a thickness of 2 feet 4 inches, till they touch the circle. Beyond, and concentric with this inner circle, at a distance from it, of 11 feet 7 inches, is a massive circular wall measuring 18 feet 3 inches thick. Its outer surface is shown, by a chunam facing which still remains on a few of the lower courses. On the south, 2 feet in height is left; it is perfectly vertical. The space between it, and the inner circle is divided into sixteen cells by a like number of walls which radiate from the centre, and connect the two circles. These walls are 2 feet 4 inches thick, and twelve of them branch out from the inner circle from the points where it is intersected by the before-noted inner cross walls. The thirty-two hollow chambers thus formed in the interior of the stûpa are filled with firmly-packed black mud. The additional four walls are placed opposite the four corners. Around the outer circular wall, is a stylobate 5 feet 7 inches broad and 4 feet 6 inches high. It is broad enough for a procession-path; and has doubtless formed the lower one of a series of such. Its wall leans forward at a considerable angle, and the offset on the top slopes out and downwards. It is unbroken on all sides except the east. It was excavated all around, except where the palm tope prevented it; and no marbles were found standing in position against any portion of it. The quarters of this base, which face the four cardinal points, have each projected 5 feet, for a length of 17 feet 6 inches. The projection on the north side is nearly complete; on the south, a few of the lower courses remain; on the east it is entirely away; and of that on the west, a few traces remain. On the face of the wall,

[1] The shading indicates the walls laid bare by excavation. The remaining walls can be traced on the surface of the mound.

GHAṆṬAŚÂLÂ.

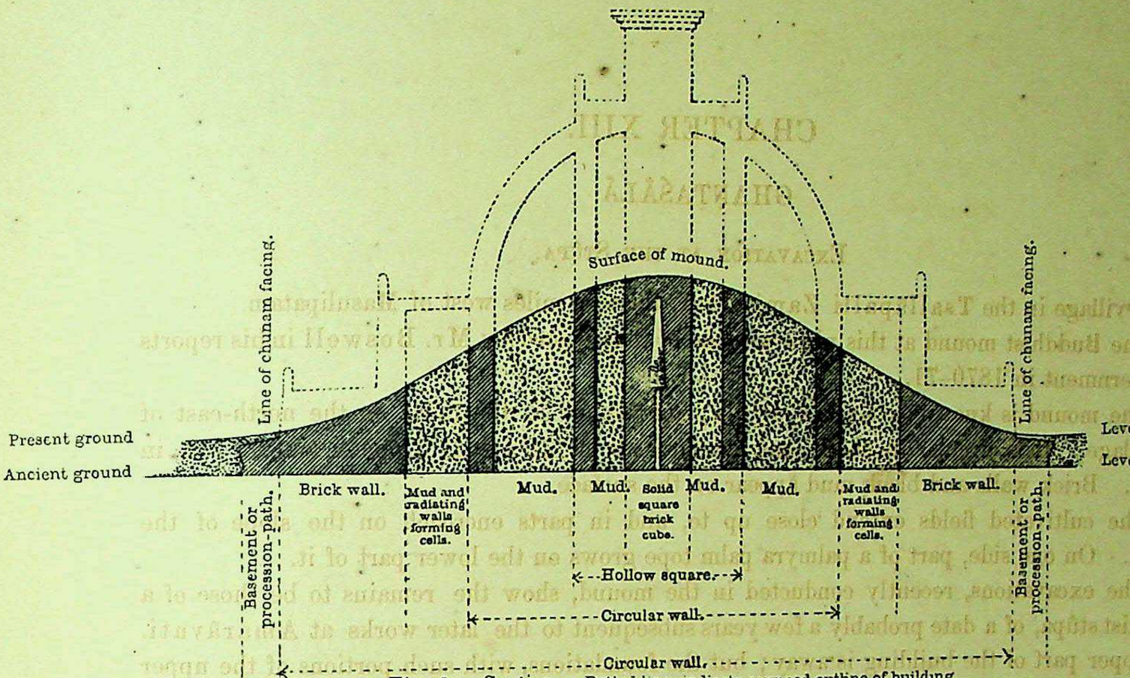
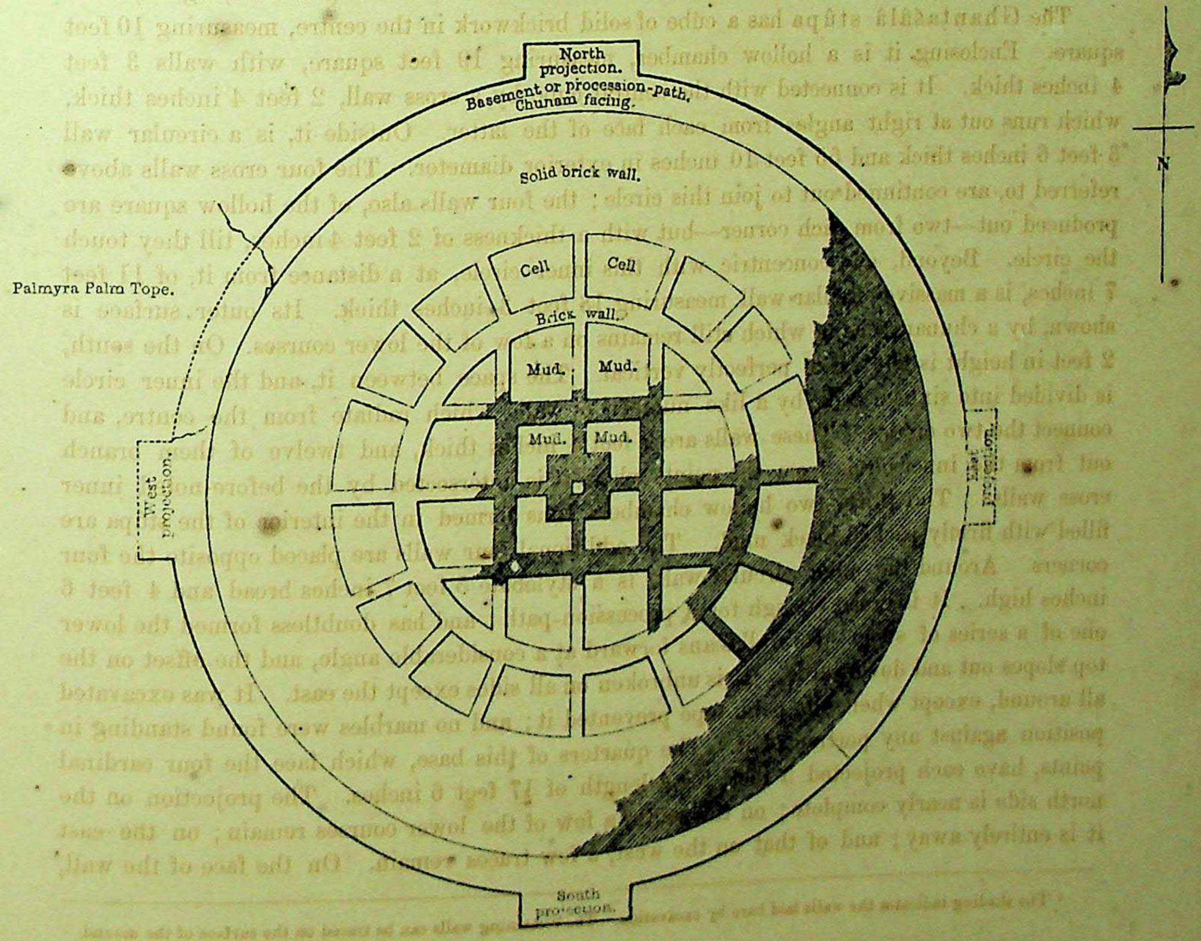


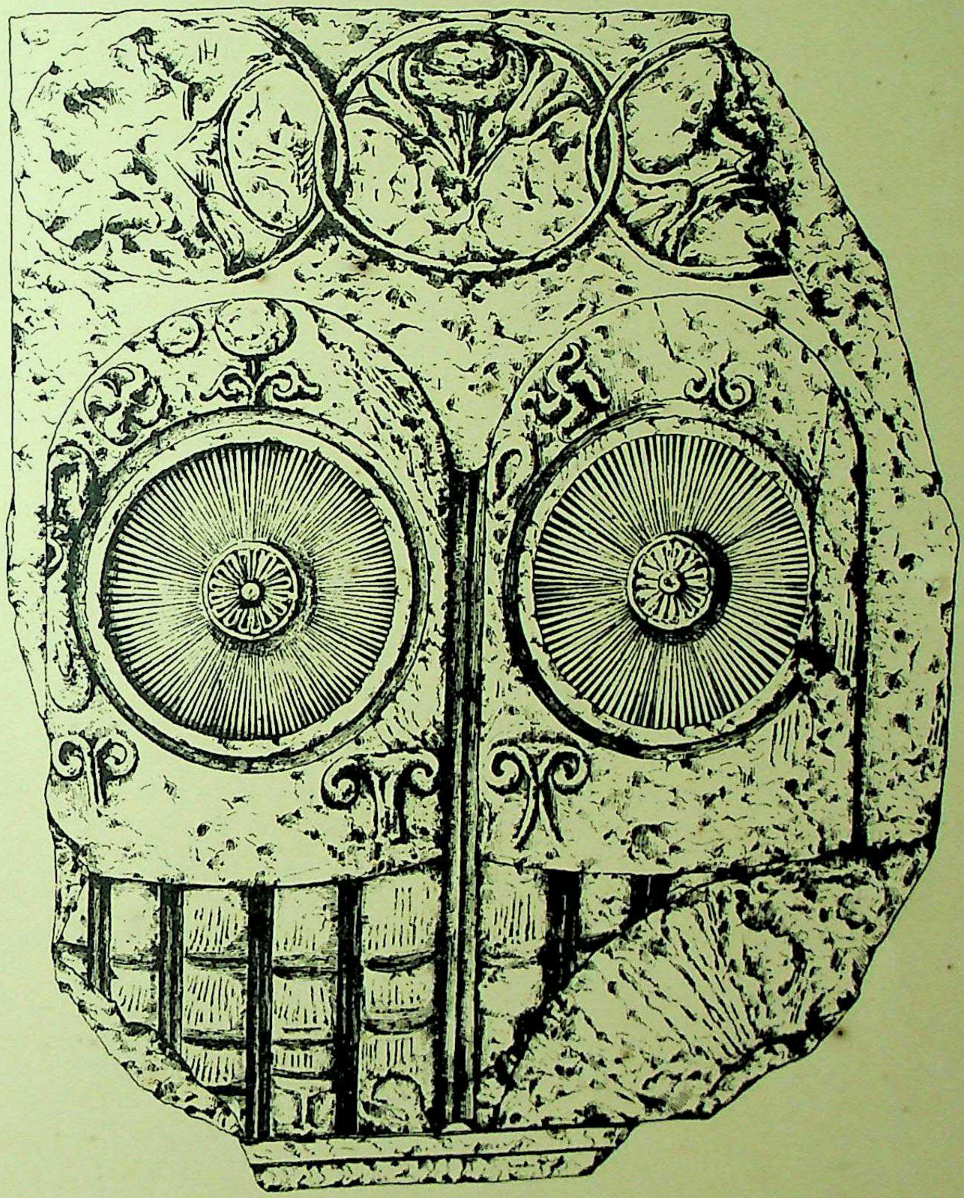
Fig. 1. Section. Dotted lines indicate assumed outline of building.



Scale of 5 10 20 30 40 50 100 150 Feet

GHAṆṬAŚÂLÂ.

A MARBLE ŚRÎPÂDA.



Scale of 12 9 6 3 1 Foot

GHAṆṬAŚĀI

Fragment of the Outer Face of a Rail Panel.

PLATE XVII.

GHAṆṬAŚÂLÂ

Relic Casket.

Fig. 1. Outer Casket.

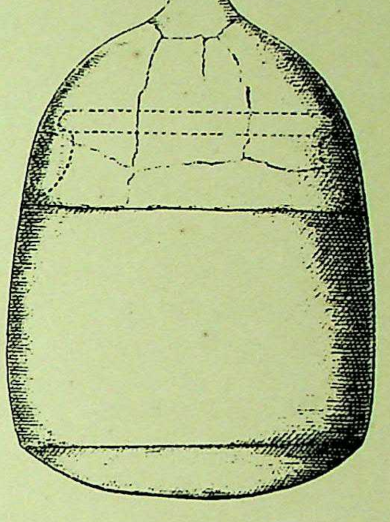


Fig. 2. Section.

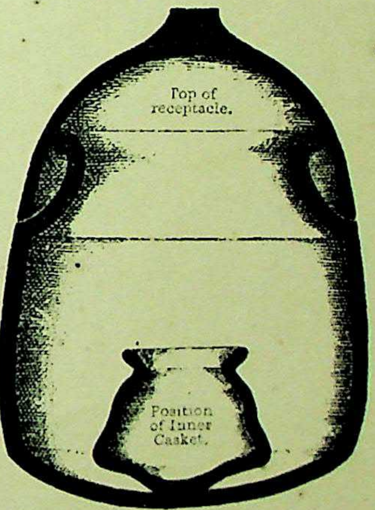
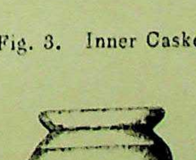


Fig. 3. Inner Casket.



Scale of 1 2 3 4 5 6 Inches.

over and opposite the south projection, a mass of chunam was observed. This seems to have been an ascending stair, or other feature: it may also have existed at the other three projections. Around the basement, and now from 4 to 6 feet underground, is a brick floor. It is much broken up, and it is now impossible to tell what its breadth may have been, or whether a marble rail stood on the outer edge of it. Some marbles were found lying in the earth outside the south projection: only two are carved. A number of these were small plain slabs, some with a splay on one edge.

One panel is carved with the Śrîpâḍa or Buddha's footprint. (Pl. XV.) Three corners of the slab are broken off. It is similar to some which were found at Amarâvati. The carving is much weather-worn. Behind the heels is a lotus flower scroll. On the soles of the feet are two chakras, "the two beautiful brilliant white wheels with a thousand rays" described by the legends which enumerate the thirty-two personal marks of Buddha.[1] Around the chakras is a variety of emblems. They are much worn; the svastika with bent arms, and the triśula, can be clearly distinguished; only traces of others appear. The other carved stone is a fragment of a top rail panel (pl. XVI). It is plain on the back. It has the half of a chakra mounted on a pedestal, with a portion of a flowing scroll on the one side of it. In the top panel of a detached rail, with carving on both sides, the scroll is placed on the outer face. The height of this stone is insufficient for such a rail as would have been placed around this building. It is more suited to such as would be found on the edge of a raised procession-path around the dome; and as such it may have been used.

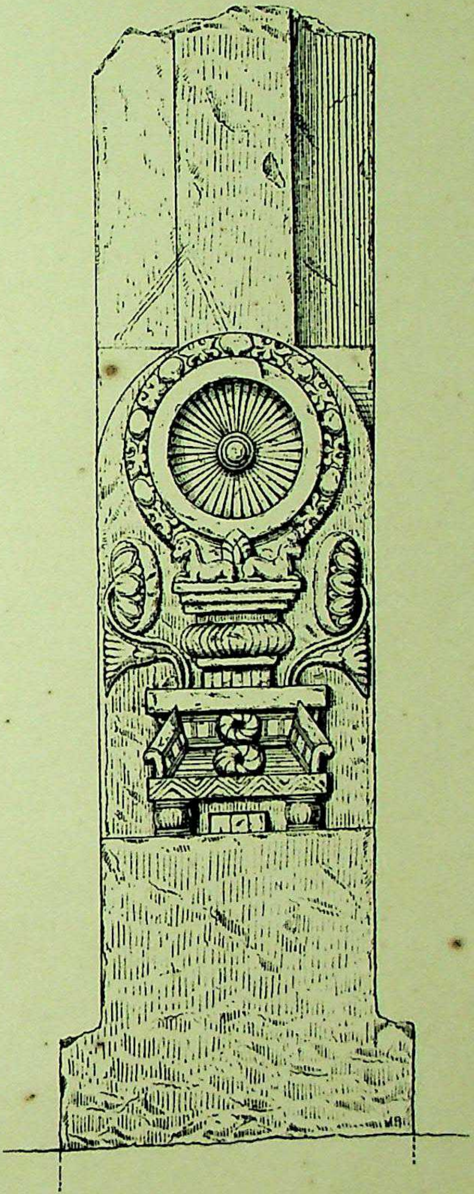
The brickwork on the surface of the square in the centre of the stûpa appeared quite solid, and was laid in parallel courses. It extended thus for a depth of 3 feet. At that point, in the centre, was the top of a well, 9 inches square, filled with earth. Among the first earth removed, were pieces of a broken chatti, and the following articles which, apparently, it had at one time contained,—a small lead coin $\frac{3}{8}$th inch square, with an illegible symbol on one side; a pentagonal blue and white crystal bead $\frac{9}{16}$th inch long; and three small beads. Scattered around among the earth—and which had evidently been placed with the same purpose as were the gold flowers around the small caskets at Bhaṭṭiprôḷu—was a quantity of red, white and blue pieces of crystal quartz. Just below these, was a small red earthenware chatti, $4\frac{1}{2}$ inches in diameter and height. It has a semi-circular lid with a small knob on the top. (Pl. XVII, figs. 1 and 2.) It was filled with fine black earth. In the bottom stood a small glazed chatti, made of a material resembling stoneware. It is $1\frac{3}{4}$ inches in height, with a diameter of $2\frac{1}{4}$ inches. (fig. 3.) In it were—two small pieces of bone or coral (?); a white hexagonal crystal bead, $\frac{5}{8}$th inch long; five small round beads; a flat mother-of-pearl bead; six small pearls; two pieces of yellow crystal (quartz?); two bits of gold leaf, one of them cut as a flower with eight petals; and some bits of a mineral like that found in the third casket at Bhaṭṭiprôḷu (silicate?).

The small well in the centre of the stûpa gradually increased in size, till, at 13 feet from the surface, it was 2 feet 6 inches square. For the lower half of that depth it was filled with clay. The well there, was closed with a brick. Below that, the well was 9 inches and 12 inches square, each alternate course, down to the foundations, 26 feet from the summit of the mound. This portion also was packed with clay. There were no other relics. The foundations rest on sand. The various sizes of the openings of each course, in a portion of the well, is a feature also observed at Bhaṭṭiprôḷu. The bricks used in the central walls at Ghaṇṭaśâlâ are of very inferior material. It is difficult to find a perfect brick among

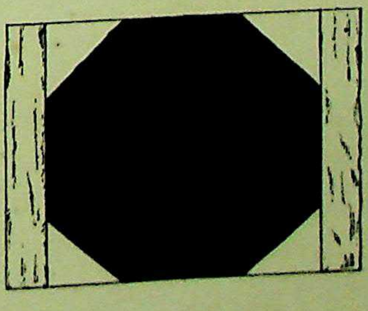
[1] Burgess: *Amar. and Jagg. Stûpas*, p. 97.

GHAṆṬAŚÂLÂ.

Marble Pier.



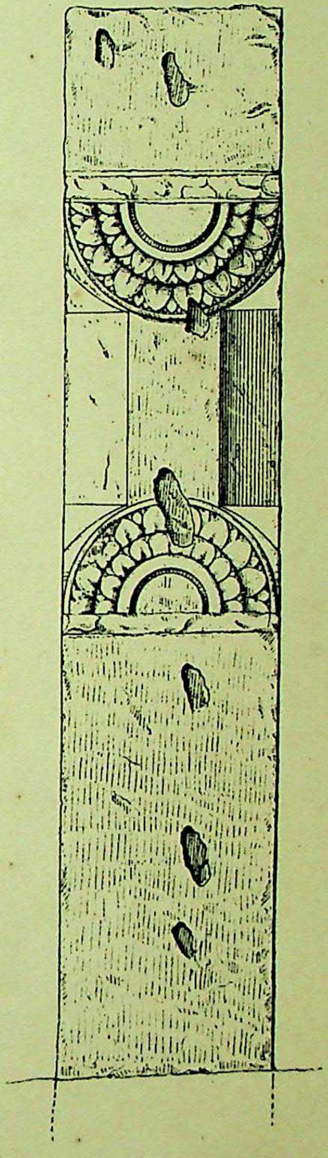
Plan.



GHAṆṬAŚÂLÂ.

Inscribed Marble Pier.

(Inscriptions not shewn on drawing.)



Plan.

Scale of 12' 9' 6' 3' 0 1 2 3 4 5 Feet.

CHAPTER XIV

PIERS.

Plate XVIII.

The carved stone represented, stands fixed in the ground under a tree in the parchari near Bauddha-vanam, on the west of Ghanṭaśâlâ. It is carved on the front and the right side; the other side and back are plain. A portion of the top has been broken off. The carving is in bas-relief, with the background but slightly sunk. The front panel has a vase at the foot from which spring varied grouped clusters of lotus and other flowers, and leaves in tiers above each other. The narrow panel on the side has an arrangement of the same ornament. The design is somewhat similar in general effect to one on the post of the northern gate at Sâñchi.[1]

Plate XIX.

This pier stands fixed in the ground at the Polimêradibba, or boundary mound. The top of the shaft is broken away: the portion that remains is octagonal. The base is square, with carvings on two opposite sides. The side represented has a throne, on which lie two lotus flowers. Behind it, two lotus flowers branch out on each side; while above it, rises a pedestal, which supports a chakra. A triśula ornament surrounds the wheel. The carving on the other side has been of similar design; but it has been nearly destroyed. The shaft over is octagonal. Four other fragments of piers stand beside this one. A few yards to the north of these, and close to the adjoining parchari, a small square uncarved pier is set up under a tree.

Plate XX.

This pier has been erected in the Jalatêśvara temple. The top and bottom are oblong; and the centre of the shaft a flat octagon. Curved stop-chamfers join the angle splays with the corners of the upper and lower rectangular portions of the pier. On the two broad faces, above and under the octagon, are semi-circular lotus-carved discs; each has traces of a carved horizontal band across its diameter: these discs do not appear on the two narrow sides. On the lower portion of the side of the pier opposite to that represented on the plate,—or facing the west, as it at present stands in the temple—is a long inscription in old Telugu characters. On the north side is another similar. On the south side are two inscriptions, the upper in Pali, and the lower in old Telugu.

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[1] *Ind. and East. Arch.*, pl. 35.

CHAPTER XV.

BASES AND CAPITALS.

Plates XXI to XXV.

The square moulded stone shown in plate XXI is kept in a Brahman pûjâri's house near the Śiva temple; it is used as a grain mortar. The mouldings are devoid of ornament.

A finely carved circular band lies at a well near the stûpa. (Pl. XXII.) It is pierced with a cylindrical hole through the centre. In section it is a torus, with three bands of ornament around it. The lowest has a row of lotus leaves; the top has a series of drooping wreaths fixed with rosettes: while the central band has a procession of groups of domestic and wild animals. Each group is headed by the elephant, behind it follow the goat and tiger; cow and deer; horse and lion; the buffalo and the boar.

Plate XXIII shows a circular moulded stone with a rectangular hole cut through the centre. It lies near a well in the Śiva temple, and is used for beating clothes while they are being washed.

Another similar stone is square, with two steps moulded along the edges, and a circular fillet on the top. It is pierced with a cylindrical hole. It is used as a base to the dvajastambha in front of the Gramadêva temple. (Pl. XXIV.)

Plate XXV.

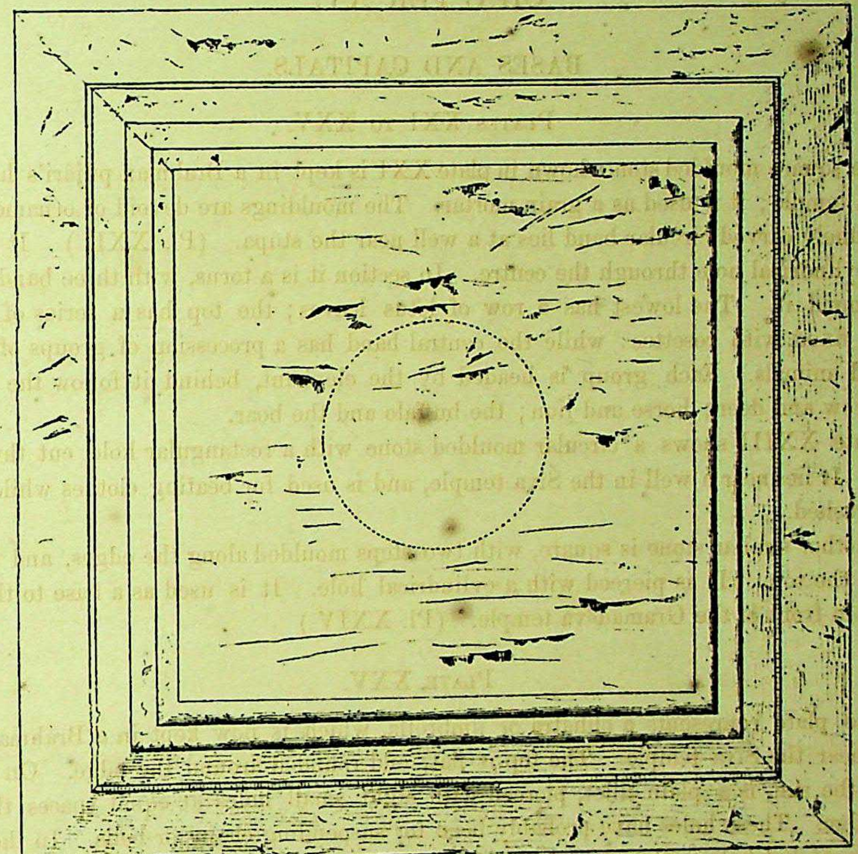
The plate represents a chhatra or umbrella, which is now kept in a Brahman pûjâri's house near the Śiva temple. The top is flat, and rounded around the edge. On the under side of the rim, is a plain fillet, pierced with eight small holes at equal spaces through its inner edge. These holes have probably been for suspending chains or bells. In the centre is a square socket-hole with a raised circular ledge around it. From this point, beaded rays radiate outwards to the rim. The umbrella is similar in size to one found at Amarâvati. It is too small to have been placed on the centre of the summit of the dome. Some of the Amarâvati stûpa slabs represent smaller umbrellas grouped around the great surmounting one; and also another over the central of the five columns placed against each of the four cardinal faces of the base of the dome. This stone may have been placed in either of these subordinate positions.

A similar stone has been removed to, and fixed as a seat in the floor of a house in Dêvarkôṭa. It is 3 feet 8 inches in diameter, and 6 inches thick above the floor. A square socket-hole is cut in the centre. The people objected to its being moved; so it could not be ascertained whether there were carvings on the under side.

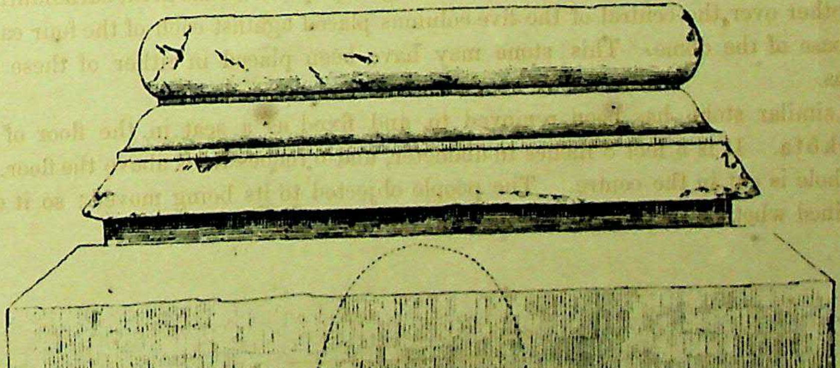
GHAṆṬAŚÂLÂ.

A Moulded Marble.

Top



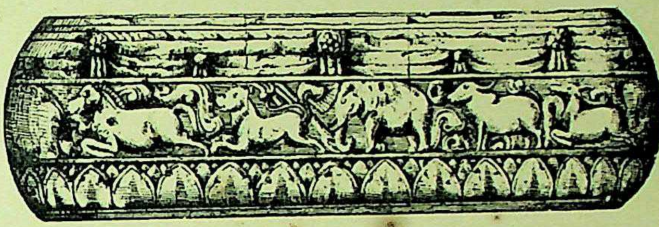
Side



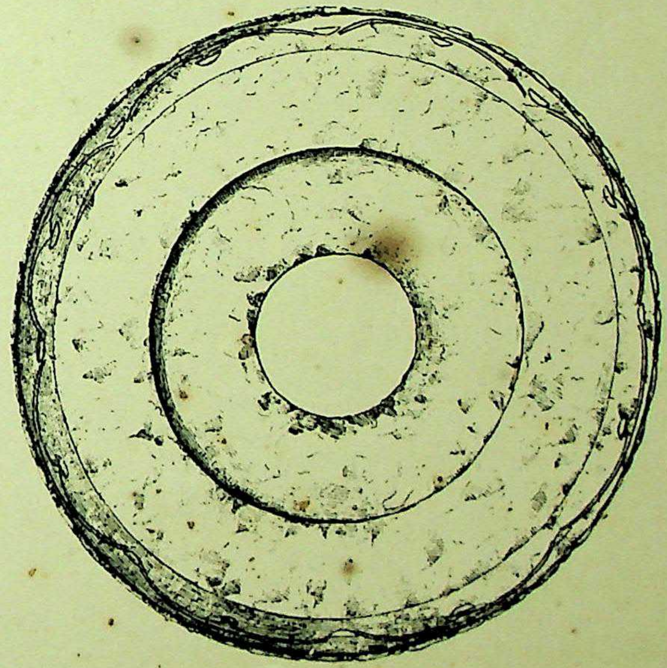
Scale of 12 9 6 3 1 Foot.

A Circular Carved Marble.

Side.



Top.



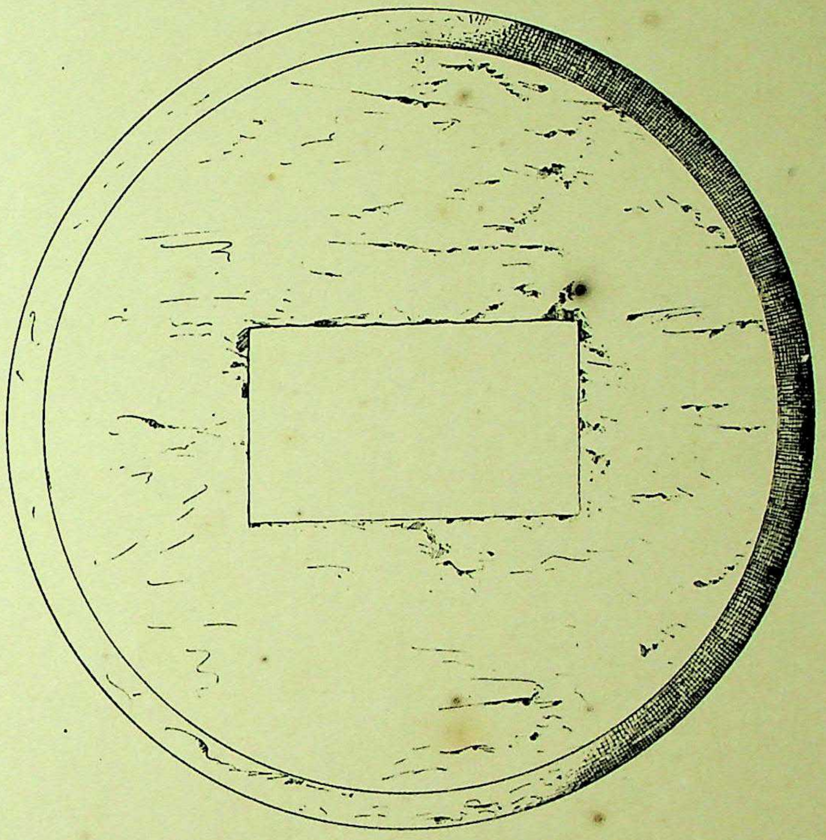
Scale of 12 9 6 3 1 2 Feet.

Litho., S. I. O. Calcutta.

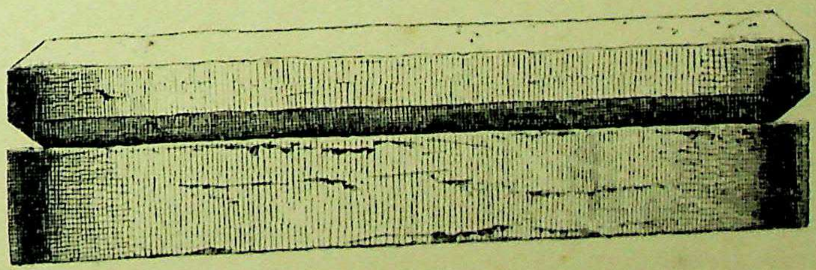
GHAṆṬAŚÂLÂ.

A CIRCULAR MOULDED MARBLE.

Top



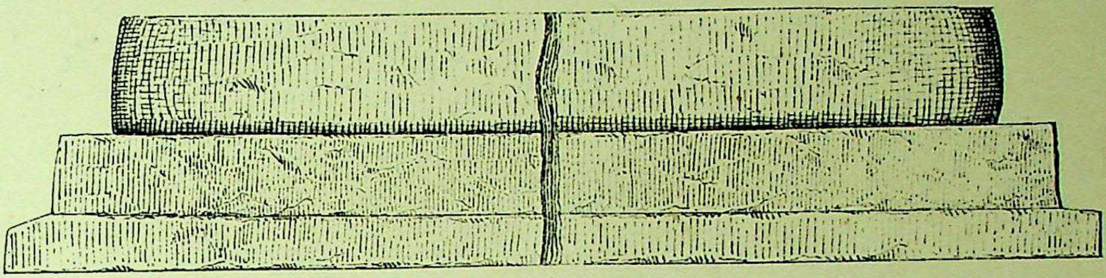
Side



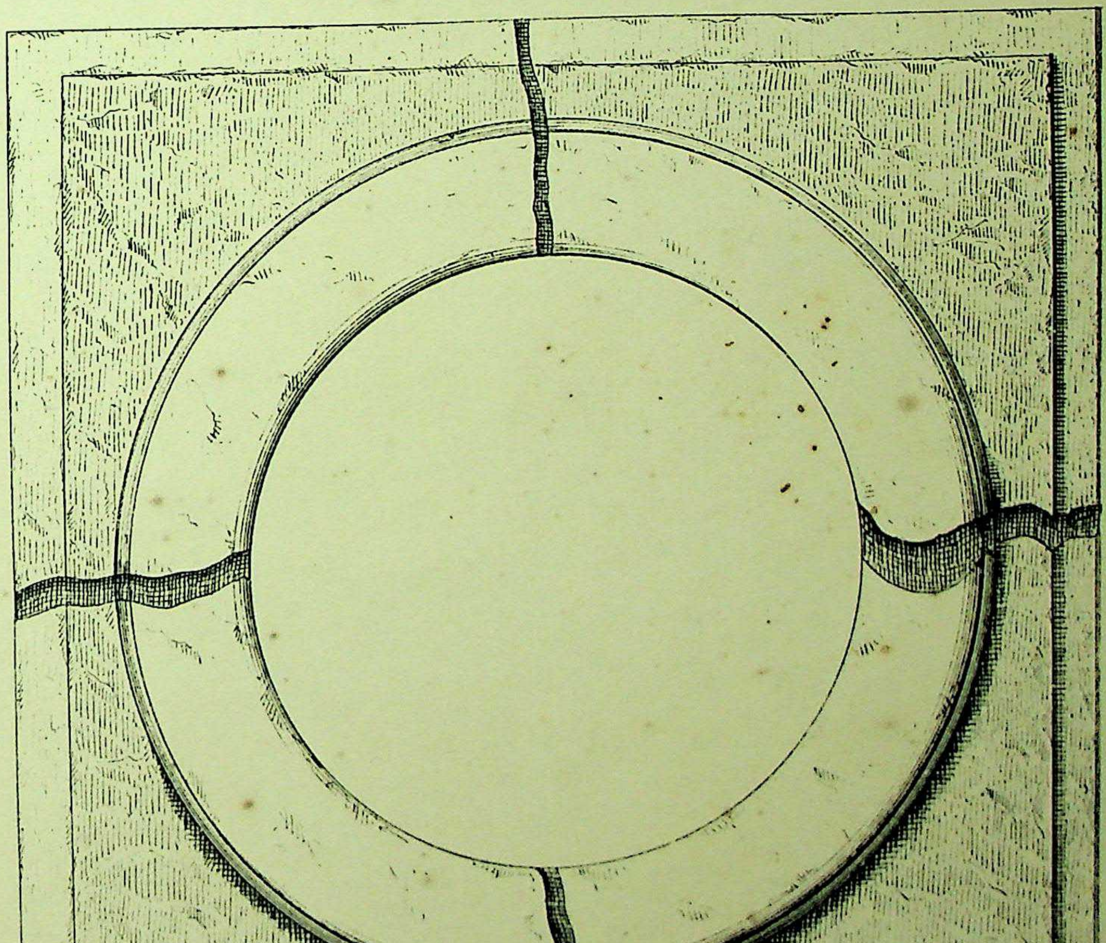
Scale of 12 9 6 3 1 2 Feet.

A SQUARE AND CIRCULAR MARBLE.

Side



Top



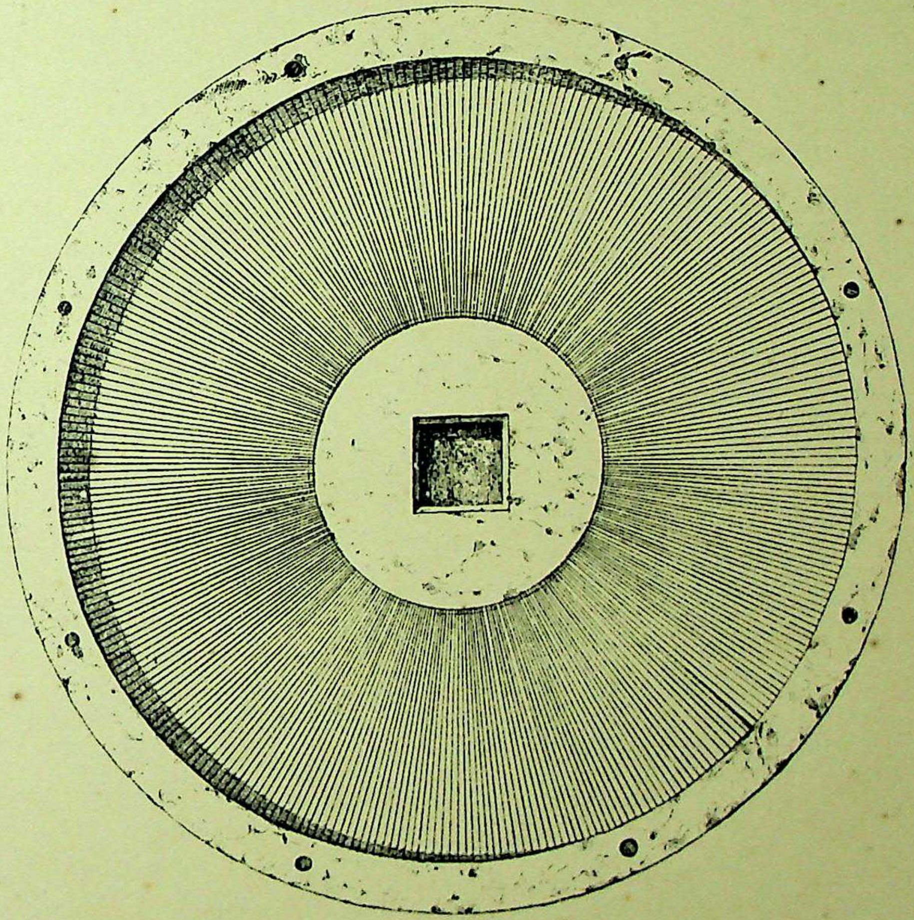
3 6 9 12

GHAṆṬAŚÂLÂ.

Marble Umbrella.

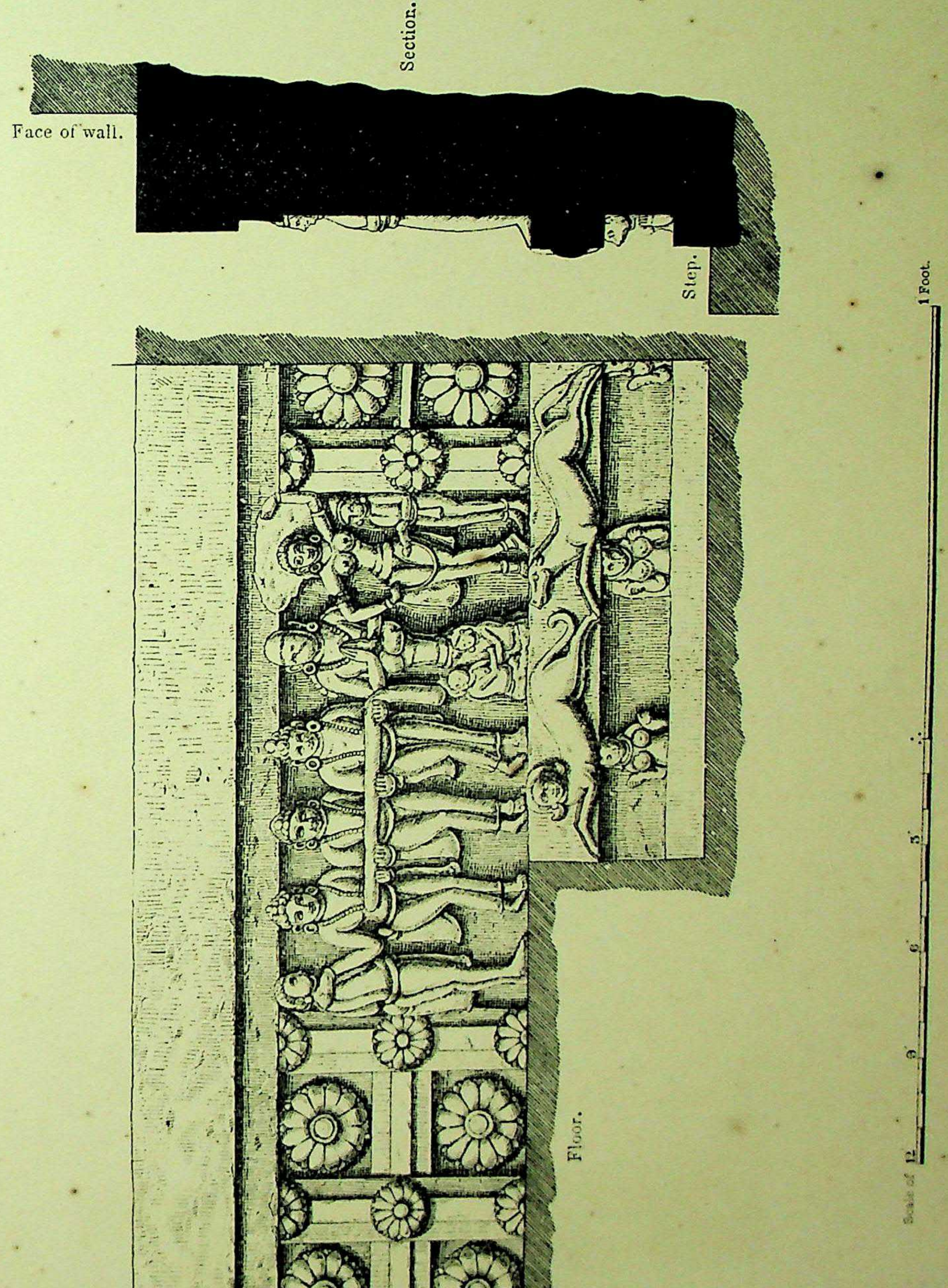
Section.

Plan of under surface.



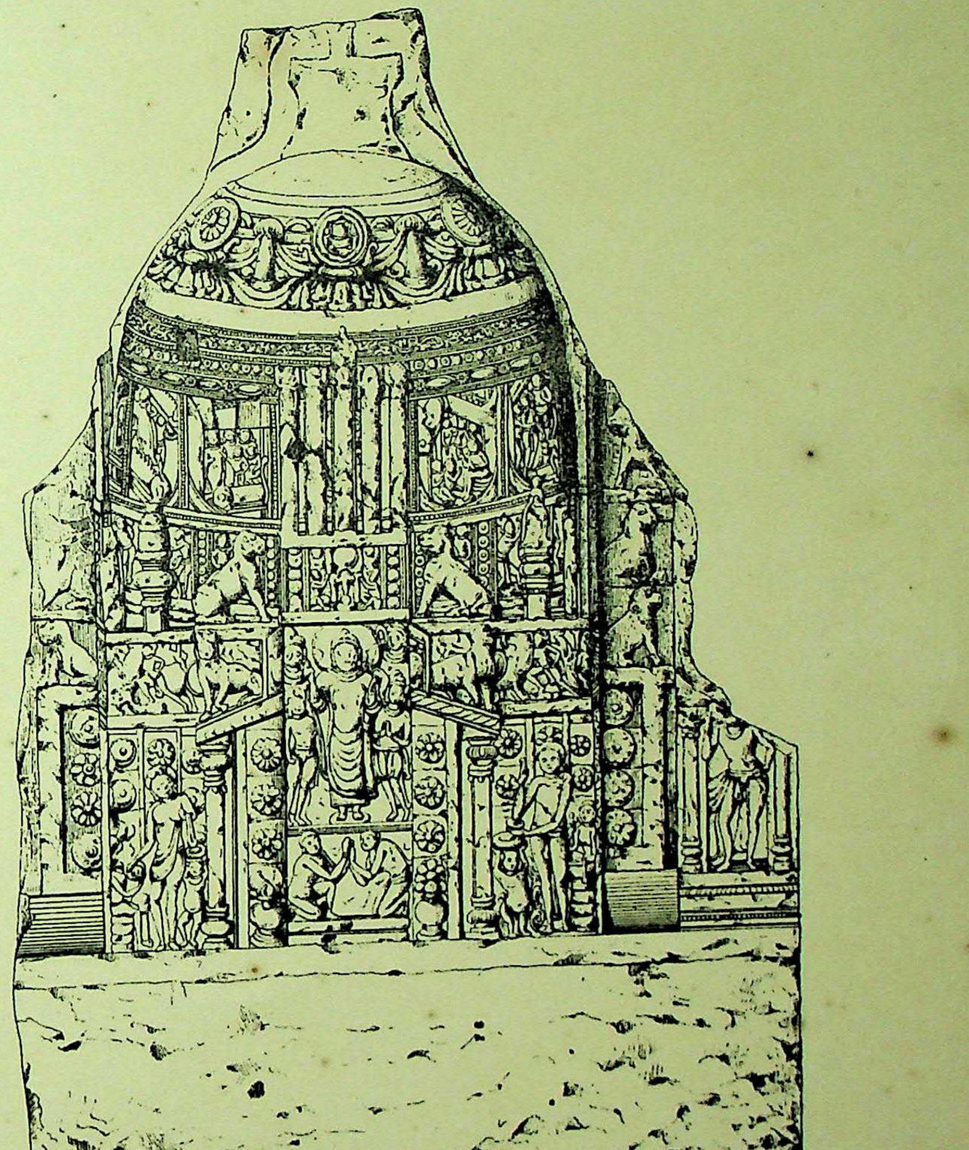
Scale of 12″ 9″ 6″ 3″ 0 1 Foot.

GHAṆṬAŚÂLÂ.

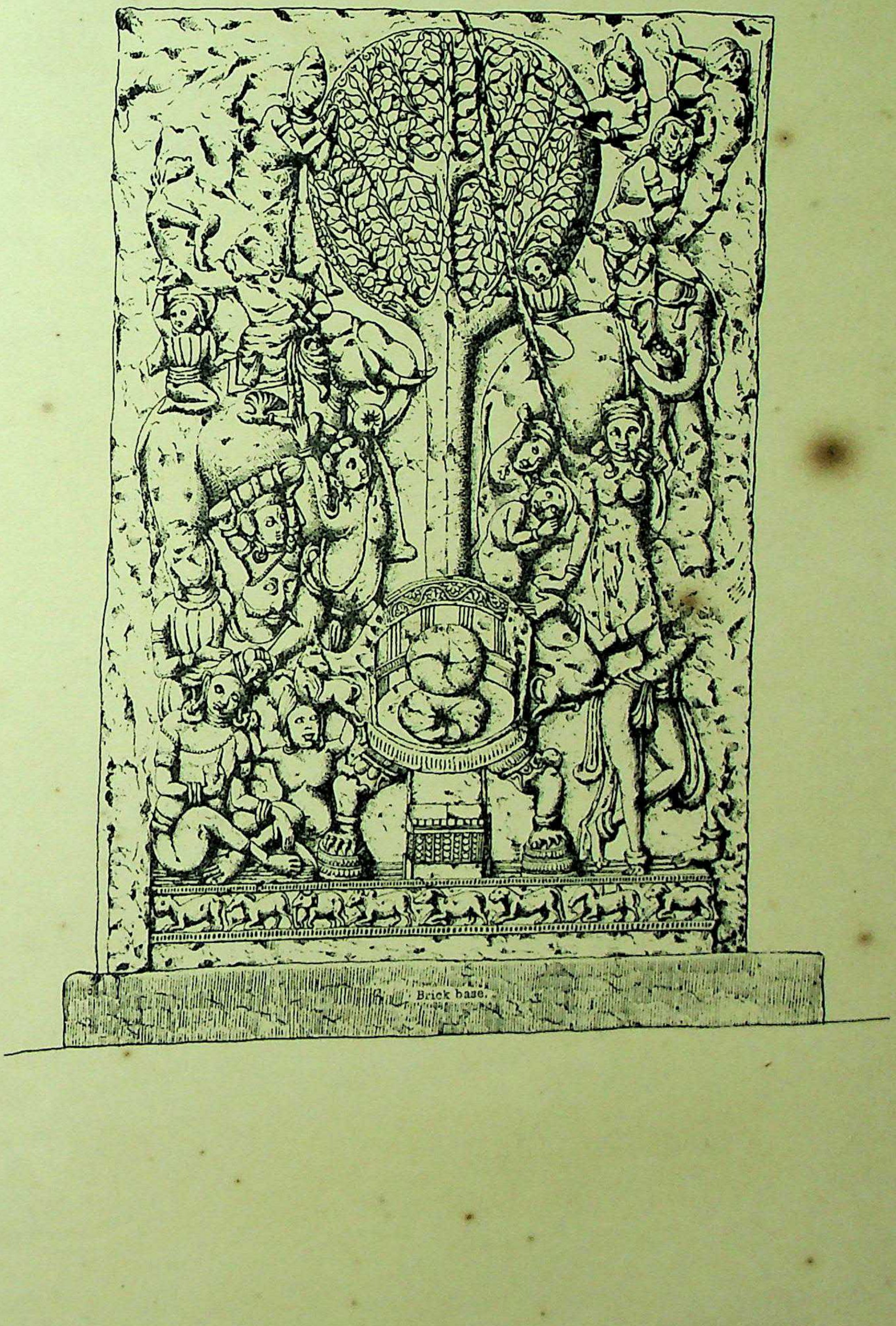


A Marble Rail Panel.

A MARBLE STÛPA SLAB.



MARBLE SLAB, NOW AT RÂMANAGARAM.



Scale of 12 9 6 3 1 2 3 Feet

CHAPTER XVI.

SLABS FROM THE STÛPA.

Plate XXVI represents a panel now fixed against a wall behind some images in the Jalatêśvara temple. It shows the posts, lotus discs and cross-bars of a rail. An open space, seems to be the gate in which a number of offering-bearing worshippers are entering. Below is a frieze with a horse, and an animal with a human head. This band evidently goes right along under the panel, but is sunk into the ground. Underneath, are a number of figure brackets. The slab seems to have been one of those which formed the parapet around one of the upper procession-paths.

Plate XXVII is a fine slab with the representation of a stûpa. It now stands in the road against the court wall of the Śiva temple. It presents no material difference from others found at Amarâvati and Pedda Gañjâm. Those from the latter place were found standing in position against the face of the basement. It is likely that this would be similarly placed. A statue of Buddha with worshippers around, occupies the principal panel inside the represented gateway. Over is the usual group of five pillars. On the top of the central of these piers, will be observed the remains of the umbrella, before alluded to. The projecting side gates are shown on each wing. Outside the front gateway are worshippers, with attendant dwarfs bearing offerings. The building is ornamented with sculptured panels from base to summit. The two upper corners of the slab are broken.

A finely sculptured slab (pl. XXVIII) now stands in the road in the village of Râmanagaram (Râmagrâma). It is worshipped by some of the villagers at certain seasons. It represents the worship of the sacred bodhí tree. At the trunk of the tree is a throne, bearing two lotus blossoms. The seat is supported on two legs with lion claws, raised on two carved cushioned bases. The whole space on both sides is filled with worshippers. On each side is an elephant, one facing to, and the other facing from the tree. The drivers and riders on their backs, turn to and worship the tree. Some bear offerings, and others sit in adoration around the foot. A figure on the left has a curious mask on the breast, precisely similar to some on the slabs from Peḍḍa Gañjâm. The heavy bracelets and anklets on the women is a noteworthy feature, and the great ornaments through the ear lobes of one, standing by the side of the tree, specially so. Under the slab, is a band with eight animals, showing the lion, deer, elephant, bullock, goat, tiger, horse and buffalo.

A fragment of a slab from the base of the stûpa is in a field near the brick mound subsequently described as on the boundaries of Dêvarakôṭa. It is plain, with a carved pilaster on one edge.

CHAPTER XVII.

MARBLE SLABS WITH MODERN SCULPTURES.

Plates XXIX to XXXII.

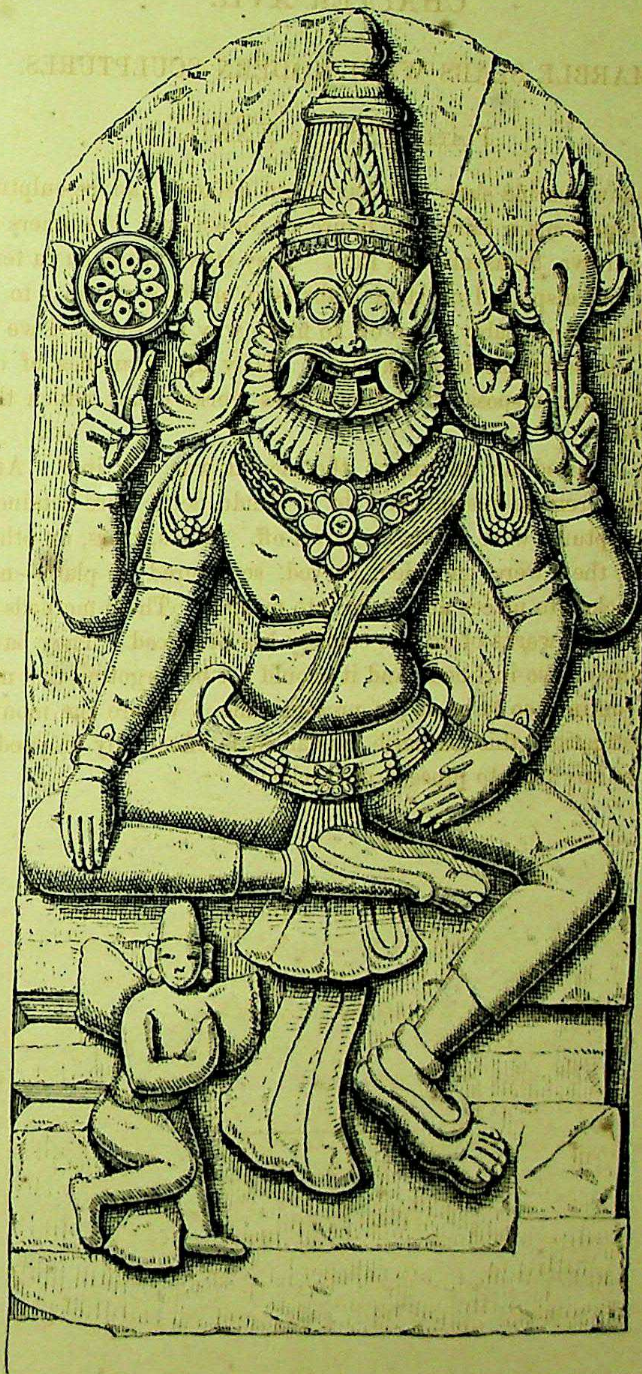
These plates show marble slabs that have been defaced and resculptured with Hindu deities. The first represents a fairly cut figure of Narasiṁha; the others are very coarsely carved; they are Bhairava, Sarasvati, and Rati. They stand in the Śiva temple.

The crude carving displayed on these slabs is in marked contrast to the style of the sculpture which was most probably hewn off to make way for them, if we may judge from such examples of the latter as have survived. They are examples of one of the three methods employed in the disposal of the matchless works of art which these buildings so abundantly produced.

If a slab was required for an image, the mound was dug into. Any found bearing sculptures with some remote resemblance to a Hindu deity were retained and set up for worship. Other sculptures were ruthlessly hewn off. Slabs, piers, or other details—it was immaterial whether they were moulded, carved, sculptured or plain—not so required or convertible, were hacked to pieces and made into mortar. These methods mark the popular appreciation of the finest works of art the country has produced. They have ever been open to the disposal of any one so inclined; and it should not be forgotten that many, probably the majority of them, continue so to be at the present time. Where the mounds are preserved for scientific investigation, this barbaric vandalism is effectually stopped; where they are not so, it is liable at any time to proceed unchecked.

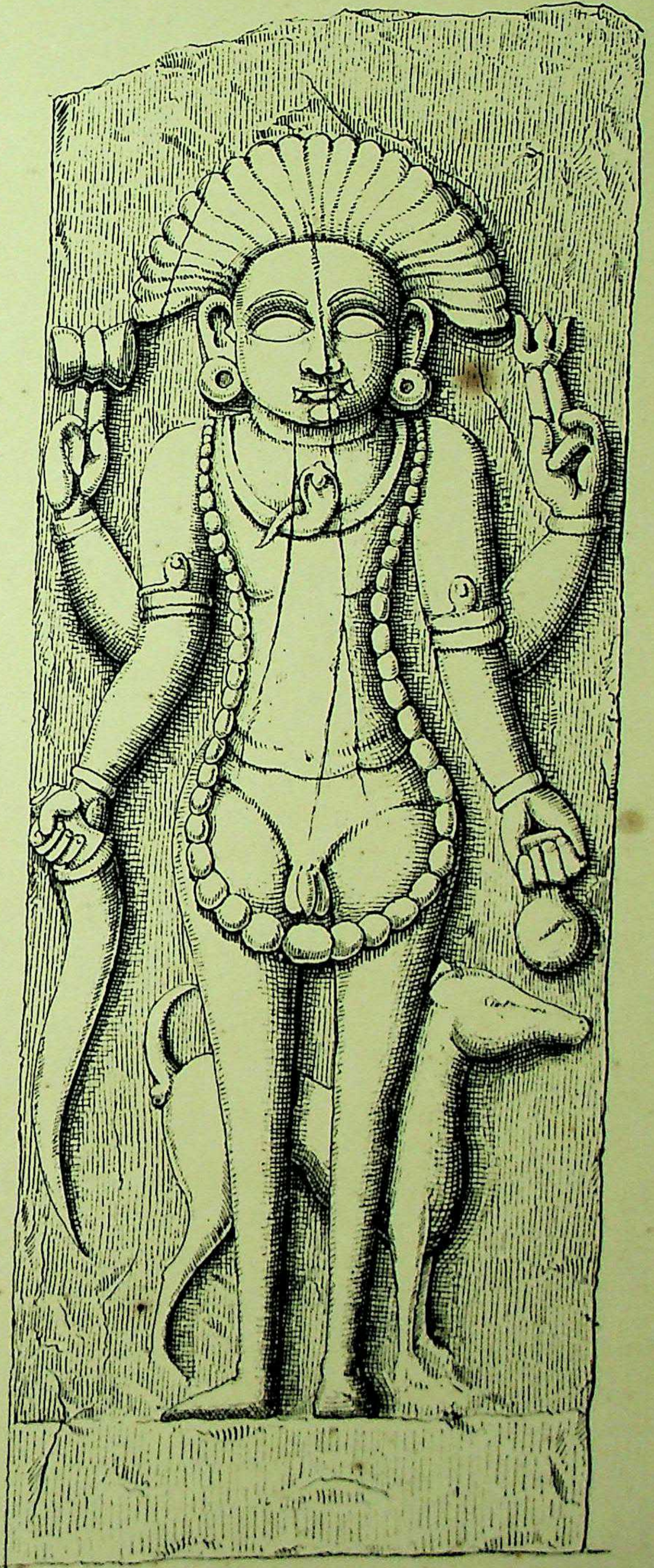
GHANṬASÂLÂ.

IMAGE OF NARASIṀHA ON A MARBLE SLAB.



Scale of 12" 9" 6" 3" 1 2 Feet.

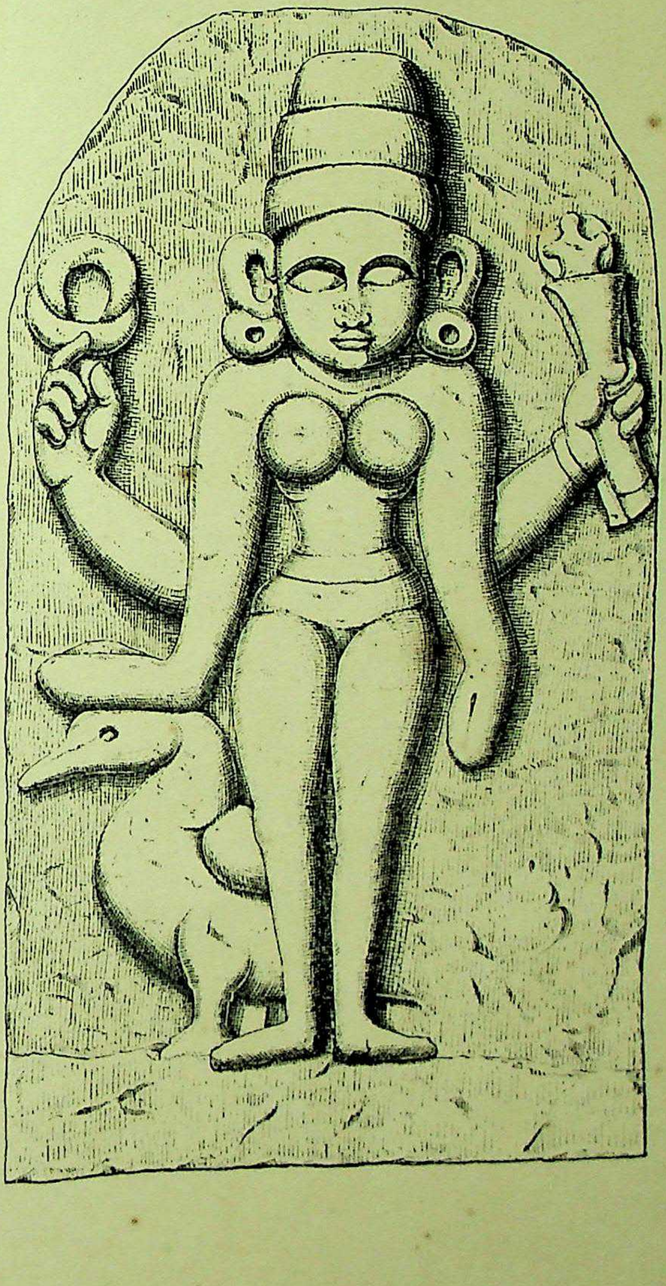
IMAGE OF BHAIRAVA ON A MARBLE SLAB.



1 Foot.

GHAṆṬAŚÂLÂ.

IMAGE OF SARASVATI ON A MARBLE SLAB.



Scale of 12 9' 6' 3' 1 Foot.

GHAṆṬAŚÂLÂ

Image of Rati on a Marble Slab.

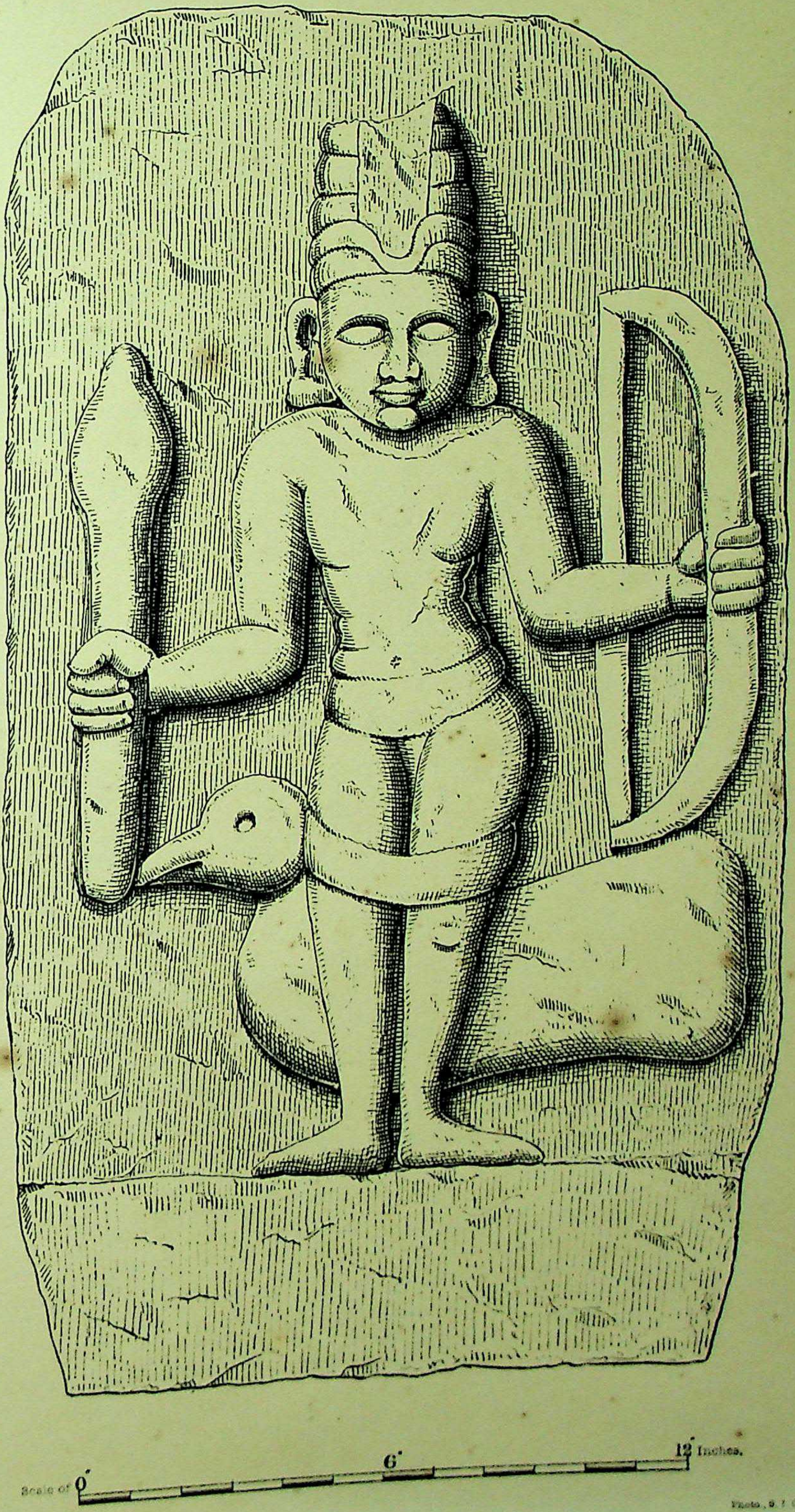


Photo., S. I. O., Calcutta

CHAPTER XVIII.

THE DESIGN OF THE STÛPA.

The design of the building may, according to the plan (pl. XIV, fig. 2) have been either of three forms. The first probable plan is that of an ancient small stûpa, represented by the inner circular wall, which had been encased in a larger and more modern dome. Some of the stûpas in Ceylon are admittedly in this form. Secondly, the building may have originally been a great dome springing from the line of the chunam facing on the top of the basement. The interior walls would, with it, have been placed to strengthen the dome. The third is, that the inner circle represents the original dome, while the walls outside it are the foundations of procession paths around it.

Against the first, is the fact that the wall of the inner circle is perfectly vertical for its present height, and in parts leans outwards. Had it been as assumed, the dome would not have been stilted in this way; some trace of the inward curve of the roof would, certainly at this height, have shown itself. The curve would have been started from a point at or about the level of a low surrounding basement, some few feet above the level of the ground. The builders also, of the encasing dome, would not, except at the cardinal points, have known to space the radiating walls so as to have them exactly opposite the cross walls in the interior of the inner circle. Moreover, the junctions of the inner circle, with the radiating walls outside it show no vertical open joint.

Against the second supposition of a large outer dome, is the great and unnecessary thickness of the outer ring, 18 feet 3 inches exclusive of the outside basement. This breadth is entirely out of proportion to any other of the stûpas in the district. The inner walls also show a distinct design, which would be unnecessary, and unlikely, if they were simply placed as interior supporting walls.

The third design which the plan suggests, seems the most probable of the three. It is that of some other stûpas which will now be alluded to. With no adjacent examples of its class with which to compare it, some difficulty might arise in realizing what its design may have been. There are, however, some similar buildings still existing in Ceylon and further India, which supply the necessary information. Their analogous plan would strongly suggest that this building had been designed on lines similar to them. Their chief peculiarity is a succession of circular terraces, concentric with, and rising in flights up to a dome in the centre. A second feature, is the presence in these circular galleries, of small chambers used either as cells for monks or niches for statues. It will conduce to clearness of comparison, if a brief reference to those others is made. The dâgoba at Ruanwelli in Ceylon (cir. B.C. 160), has "three offsets or procession-paths rising like steps one behind, and above the other, "but with no ornament now apparent, except a plain Buddhist rail of two bars on the outer "edge of the two lower ones, and an elephant cornice to the upper" . . . . "On each of the "four fronts of this dâgoba was an ornamental projection containing and partially concealing "the flights of steps by which access was had to these galleries."[1]

1 *Ind. and East. Arch.*, p 190.

Another example at Mengûn, in Burma, has five ascending concentric procession-paths, each with niches for statues, and four flights of steps facing the four cardinal points.[1]

The temple at Boro Buddor in Java has five, in this case square, procession-paths around a central circular dâgoba. This building combines a vihâra with a dâgoba, in that the succession of statue niches in the different galleries, simulates the original cells for monks.[2] The fundamental principle is seen at another temple, Brambanam, in Java, which has a central shrine with sixteen (detached) shrines for statues around.[3] Another building, at Pollonarua, whatever its purpose may have been, has a plan which closely resembles that at Ghaṇṭaśâlâ, and may thus be also referred to. Mr. Fergusson in describing it, states, that "close to the Sat Mahal is a circular building, which, so far as "at present known, is unique. It may almost be described as a hollow dâgoba, being a circular "enclosure surrounded by a wall, but empty in the centre, at least containing nothing now. "Originally, it may have had a shrine in its centre or tabernacle of some sort, containing "a relic, or, more probably, a sacred Tree. It is surrounded by a procession-path, enclosed by "a highly ornamental screen, and beyond this by a second gallery adorned with a range of "slender pillars, like those which surround the dâgobas at Anuradhapura; below this, again, "is a richly-carved stylobate. Four flights of steps lead up to its procession-paths, more "magnificent and elaborate than any others that have yet been discovered in Ceylon."[4]

A comparison of the plan of the present building, with those above quoted, will show that it must belong to the same class. The inner circle forms the wall of the dome, stilted to the springing line at the level of the procession-path which surrounds it (pl. XIV, fig. 1). The breadth from the dome wall to the face of the outer brick ring is excessive for only one procession-path. The proportions would indicate two, in addition to the stylobate itself a procession-path. The facing wall of the upper offset would rise over the inner circumference of the broad outer ring. The two paths thus formed, are of similar breadth. They would probably have a parapet around the edge of each. The lower stylobate may also have had the same, or a row of slender pillars, as in one of the examples quoted from Ceylon. The relics are usually placed at the level of the procession-path. The approximate heights of these galleries would thus be fixed by the position of the relics in the relic chamber in the centre of the stûpa. The small chatti was found 3 feet from the surface of the mound. Its position would fix the level of the upper path and springing line of the dome. The bottom of the wide portion of the relic chamber, 10 feet below the top of it was from its shape, evidently intended for the reception of a relic. It would mark the height of the second gallery. The solid square in the centre of the building would be carried up, and form the thî over the dome summit. The walls of the hollow square chamber would support the rails of the enclosure, which sculptures represent around the thî. The approximate heights of the building may thus have been, 4 feet 6 inches to the level of the existing stylobate: a further height of 8 feet 6 inches to the second gallery, with the upper one 10 feet above it. If the dome were a semi-diameter, its height above the upper procession-path would equal 27 feet 11 inches, thus making its total height, exclusive of the thî, nearly 54 feet. The radiating walls outside the inner circle or assumed dome, may have been simply added to strengthen it, by preventing the great lateral thrust which would unavoidably take place in a dome of inferior brick construction thus stilted. That a lateral thrust has resulted, even

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[1] *Ind. and East. Arch.*, p. 624.
[2] *Ibid.*, p. 646.
[3] *Ibid.*, p. 652.
[4] *Ibid.*, p. 203.

with these buttressing walls, is shown by its bulging out at parts. This latter fact itself strengthens the theory of this having been the dome wall. The radiating walls probably served a two-fold purpose, in that they also may have formed cells, or niches for statues as in the similarly constructed buildings above quoted. If these existed, they would open on to the second procession-path. The two cells opposite each of the four cardinal points are wider than those in the angles. Thus, room would be left for a sufficiently broad stair to pass up between them to the upper gallery, and yet leave their façades of the same width as that of the intermediate cells. Though, as at present existing, these cells are filled with packed mud, it must be remembered, that the walls only represent the foundations below the line of the gallery on to which the cells would open.

CHAPTER XIX.

OTHER REMAINS IN AND NEAR GHANṬAŚÂLÂ.

Bauddha-vanam, or Dharmakôṭa is an ancient site, now a piece of waste ground near the parchari on the extreme northern boundary of the village. Pits have been dug at places, by the villagers, for mud. In these holes are numbers of large bricks. Other antique objects are occasionally found by the diggers, but it is probable that in the majority of cases, nothing more is heard of them. Some time ago, a brass dîpa and a brass image of Śiva were found here. They are now in the Śiva temple at Ghanṭaśâlâ. A small triśula and a chakra were recently found on the same spot. These have all probably belonged to some Hindu shrine which once stood there. The dîpa (pl. XXXIII, fig. 2) is similar to many now in use in temples, for burning camphor before the image. It has a moulded base and bowl, each with a line of Telugu letters around it. These mention the name of a Chetti, one Uchchasettiyappa as the builder of the holy seat of the friend of Lakshmi, *i.e.*, Vishṇu. The lid to the bowl is hinged and perforated. A handle with a vyali's head in the middle, is fixed to the necking; its other end rests on a small circular base. The small Śaivite image is represented on plate XXXIV. The two small projections in the base are for affixing a canopy. Two holes below them are for the cords which bind the image to the vâhana, or other pedestal on which it is carried during processions. The head-piece is a curious one, and the bands around the knees are not usually seen on such images. Plate XXXIII (figs. 1 and 3) shows the triśula and chakra just referred to. Each is fixed on a pedestal, or hand grasp, moulded with alternate beads and hollows, and moulded base and capital. The chakra encloses a cross with cusps in the quadrants; these give it the appearance of a small runic cross.

REMAINS NEAR GHANṬAŚÂLÂ.

At the south-west of the parchari on the south boundary of the village, is a low mound named Polimêradibba. Some loose bricks appear on the surface of the mound, but it has been so much demolished, that the traces are not sufficient to show what building may have been there. Some marble piers from the stûpa are fixed on the mound as boundary posts. A few yards away, are some earth pits; these show courses of ancient brickwork at two feet from the surface.

On the south, just over the village boundaries, and situated within those of Dêvarakôṭa, is a low mound on the banks of a tank. It measures about seventy feet across, and is roughly circular in plan. The foundations of brick walls appear at places, and brick debris lie all over it. It may possibly be the remains of a stûpa.

Śrîkâkulam is a village in the Tsallâpalli Zamindâri, standing on the left bank of the Krishṇa river about nineteen miles west of Masulipatam. It is traditionally stated to be the site of the first capital of the Andhra dynasty.[1] The present village is entirely modern. There is a large temple, which is considered very sacred. The priests state that it was founded by Anantapâla, prime minister of Sumati Mahârâja, by whom is meant

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[1] Burgess: *Amar. and Jagg. Stûpas*, p. 3.

ANCIENT PÛJA UTENSILS.

Fig. 1.

Fig. 2.

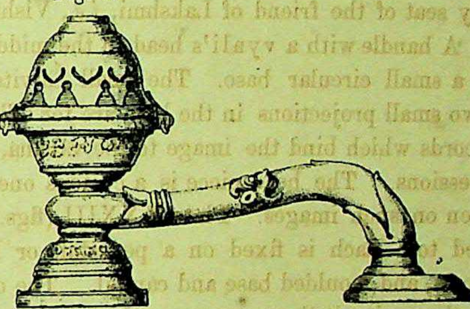
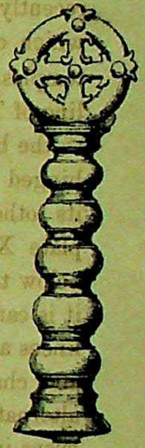


Fig. 3.



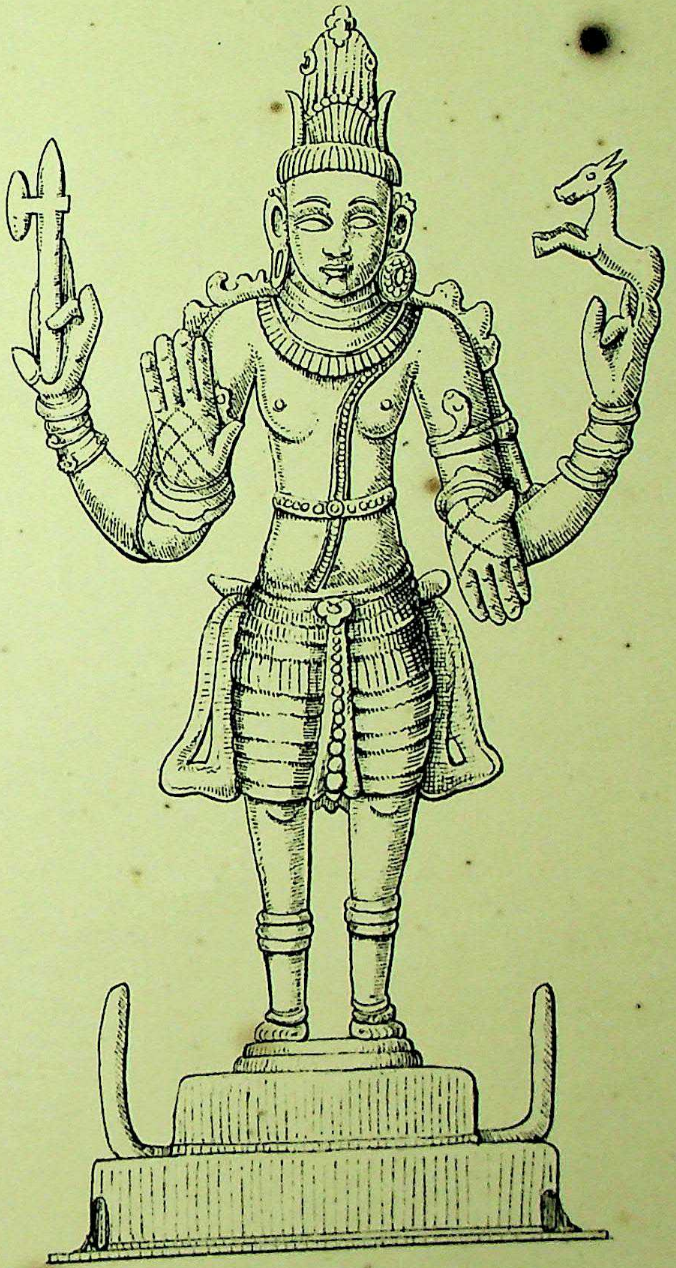
Scale for Fig. 2.

Scale of 12" 9" 6" 3" 1 Foot.

Scale for Figs. 1 and 3.

Scale of 1 2 3 4 5 6 7 8 9 10 11 12 Inches.

Brass Image of Siva.



0 3 6 9 12 Inches

Simuka, the first of the Andhra dynasty. No part of the present structure is so ancient. The earliest is the shrine, which dates from the 11th century. Later grants were made by the Vijayanagar kings and others. A large entrance gôpuram was built only a few years ago. In front of the temple is a large kulam or tank constructed by one of the Zamindârs of Dêvarakôṭa.

No traces of the ancient town are visible. It is stated to have been destroyed by the shifting of the river channel. Its site is now in the bed of the river. A temple of a much earlier date than the present one is stated to have stood there. Its ancient traditions may have been appropriated by the more modern shrine.

CHAPTER XX.

ANCIENT SITES IN THE RÊPALLE TALUK.

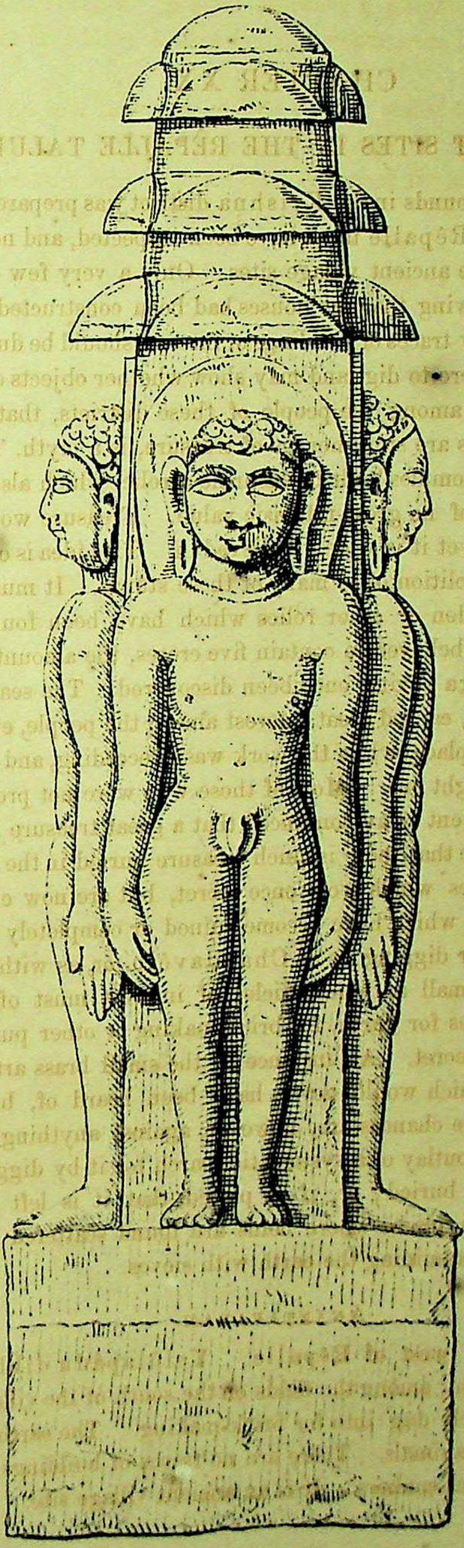
A catalogue of ancient mounds in the Kṛishṇa district was prepared by order of Government in 1889. Those in the Rêpalle taluk have been inspected, and notes of them are given below. The most of them are ancient village sites. Only a very few have remains of brick or stone buildings; thus showing that the houses had been constructed of mud. In general, only those mounds which show traces of buildings of interest should be dug into; as where these exist, they act as a guide where to dig, and may show whether objects of interest are likely to be found. The popular idea among the people of these districts, that mounds covering the remains of Buddhist buildings are store-houses of treasure, is a myth. These buildings, it is almost needless to say, were temples built to enshrine a relic, which also may have had placed along with it some articles of no great intrinsic value. Treasure would not, and never has been, found in such places; yet it is widely believed in. This idea is one of the causes which have led to the complete demolition of so many of these stûpas. It must have arisen through exaggerated accounts of golden or other relics which have been found inside them. The mound at Bhaṭṭiprôḷu was believed to contain five crores, the amount being estimated from the fact of a five-headed Nâga having once been discovered. The search for, and finding of the recently discovered relics, caused great interest among the people, even in distant villages; crowds came and visited the place, while the work was proceeding, and discussed the inscribed caskets after they were brought out. Most of those who were not present when the articles were brought to the surface went away convinced that a great treasure had just been dug out. There seems reason to believe that there is much treasure buried in the Kṛishṇa district, but it is in secret places, or in places which were once secret, but are now exposed. Such are the sites or foundations of houses which have become ruined or completely razed. These may be found by chance ploughing or digging as at Chanḍavôḷu, or, as with a find of Roman coins lately made. Numbers of small antique articles of interest must often be found by those digging into these village sites for earth, for brick-making or other purposes; but their finds are almost invariably kept secret. An instance is the small brass articles from Bauddhavanam at Ghanṭaśâlâ, which would never have been heard of, but for the coincident presence of the Survey. The chances are, however, against anything that might be found in such sites repaying the outlay of a systematic search for it by digging. It is not under every house that treasure is buried; or, if so placed, that it is left there when the house is deserted or destroyed. In places where coins are found scattered about after rain, good results may be obtained by examining the earth with sieves.

ANANTAVARAM.

Fifteen miles north by west of Rêpalle. Yelûlapâḍu dibba is a piece of waste ground, over an acre in extent, among the fields on the south of the village. The soil is black mud, and has been extensively dug into for brick-making. The earth is thickly mixed with broken pottery and bones of animals. There are no traces of buildings visible on the surface, or in the pits dug by the brick-makers. It is an ancient village site.

BEZVÂDA.

MONOLITHIC JAINA COLUMN.



Scale of 12 9 6 3 1 Feet.

Bhattiprôḷu.

Before described.

Buddhâni.

Eighteen miles west by south of Rêpalle. Jains' dibba is the name given to an ancient village site, over a portion of which the present village is built. The soil is black mud, mixed with broken pottery. Several years ago some copper Buddhist images were found.[1] The spot pointed out is now cultivated as a garden. In it lies a plain white marble pier. Adjoining it is a piece of vacant ground, with a number of large circular pits dug all over it. Some of these are for storing grain, and others to supply earth for the fields. They have been dug to an extra depth in search of treasure; but nothing, so far as I can learn, was ever found. The earth is mixed with bricks and broken pottery.

Chaṇḍavôḷu.

Fifteen miles west of Rêpalle. A large mound on the north of the village, which it has been thought might cover the remains of some ancient building, is a Muhammadan burying ground; it is thickly covered with grave stones. No examination of what it may contain, can therefore be made. On the south of the village is a low mound running east and west for a quarter of a mile. It is known as Kôṭadibba, and is said to be the remains of a fort. Broken pottery and bricks are found when the earth is disturbed. When any digging is done by the roadside or in the house-yards of the village, pillars and other stones are occasionally turned up. An immense treasure in gold was found at some considerable depth underground when the canal was being cut. It was discovered by chance, as in most cases of treasure-finding; and had probably been buried under a house, which had become ruined and its site ploughed over. The masses of gold were in size and shape like-bricks; and were taken by the finders to be brass and sold as such in the bazaar. The *District Manual* (pp. 209, 210) states that gold coins are often found here.

Chaṇḍûrû.

Nineteen miles north-west of Rêpalle. Uppala dibba is a small salt mound by the side of the village near the canal.

Koṇḍamuḍi.

Seventeen miles west by north of Rêpalle. In the centre of the village is a low open mound, measuring about 40 feet across and 6 feet high. It is surrounded by houses. Its section is seen at some places where it has been dug into. The earth is black mud, mixed with pottery, and layers of ashes at different levels. It forms the summit of the rising ground on which the village is built. About twenty years ago, the ground for some considerable space around it was of the same height, but the mud has gradually been removed from all sides for use on the fields, and the cleared ground built on. It is the last remaining portion of the higher ground of the ancient village site.

Maṇḍûru.

Fifteen miles north-west of Rêpalle. The Pati dibba is a low mound of black mud and broken pottery in the centre of the village. It measures about 150 feet across. It is an ancient village site.

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[1] Sewell: *Topog. Lists of Antiq.*, vol. I, p. 78.

Môrakûru.

Eighteen miles north-west by west of Rêpalle. The Kaṇḍepati dibba is a deserted village site, covering about an acre of ground, half-a-mile to the south of the village. The earth is black mud, mixed with fragments of pottery. Copper, lead, and occasionally gold and silver coins are found after rain.

Mûlpûru.

Fourteen miles north-west of Rêpalle. The Pati dibba is a mound in the village similar to that at Koṇḍamuḍi.

Peravali.

Eleven miles north-west of Rêpalle. The Jains' dibba in the village, is a mound like that at Mûlpûru.

Pinapâḍu.

Nineteen miles north-west by north of Rêpalle. The Mallipati dibba is a deserted village site near the parchari on the south of the village. It is about a hundred yards square. It has been extensively dug into, for brick-making, and encroached on by the surrounding fields, so that its original extent must have been greater. The soil is that usually found on such sites. It is said 'that about three years ago,' some gold jewellery was found here, by some one who was removing earth for the roads.

CHAPTER XXI.

BUDDHIST MARBLE CARVING FROM AMARÂVATI.

The accompanying examples of antique carving, are copied from marbles now in the Madras Museum.

Though the fragmentary remaining portions of architecture, and sculpture, found at the Amarâvati stûpa, have been already represented in the published works of Drs. Fergusson and Burgess, in a manner well calculated to give an idea of their beauties, the necessarily small scale of the illustrations prevented various details of the carving being shown, sufficiently large, to be of service to architects or others, who might wish to use them for suggestions in design. Leaving out of mention the strictly sculptural subjects, a volume might be filled with choice bits of carving—perfectly suited for adaptation to a variety of purposes—taken from the Madras Museum marbles alone. Though such a work would not be without interest—as showing the diversity of design these sculptors found it possible to evolve from a few original forms—a limited selection may partly serve the same end. To an architect or designer, who desires to produce original work in an existing style, he can generally succeed, if he only has examples before him, sufficient to enable him to realize the feeling, which runs through it; or, grasp the guiding principles observable in its design.

Some specimens of varied floral carving, to illustrate the general style of this class of work, are here shown, on a scale sufficiently large for the purpose. A few of them appear in the plates of Dr. Burgess' work; the majority have not been published.

The class of art, found in the remains at Amarâvati, has been chiefly associated with that building; but, that the perfection in the sculptural arts, existing at this period in Southern India, was general among Buddhist workmen, and not confined simply to those working at this architectural masterpiece, is shown by examples identical in style, found at other buildings of the age, subsequently discovered. For a long time it was thought, that Amarâvati was the only building in its district which contained examples of such works. It had been asserted, in explanation of the existence of some marbles at places in other parts of the Krishna district, that they might have been removed—in some cases long distances—from that building. Later researches have, however, proved, that these others formed part of buildings which stood on the sites where they were found; and, that they had no such connection with Amarâvati. The Hindu, who places no value on anything architectural or sculptural which stands outside a consecrated temple, would be the last to think of removing any sculptures for their mere artistic value. When he did so, it was, on account of some fancied resemblance certain marble sculptures might bear to some of his objects of worship; or, he removed them, as he generally did, in the form of mortar.

To the Buddhists, we owe the introduction, not only of stone architecture into India, but of a class of sculpture that in parts partook of and rivalled the life-like representations of the Greeks. Sculpture was employed to an enormous extent in the embellishment of their temples; the most perfect examples seem to have been literally covered with it from base to summit. Floral carving occupied a subsidiary place; and is used as a setting to the sculptured panels, or to enrich the details of architecture.

With the expulsion of the Buddhists, there passed away a mastery of the sculptural arts, which, in India has never since been equalled. Sculptured groups represented the human figure true to nature, with none of the grotesque, distorted forms so freely adopted in the later works of the Hindus. The more antique ornament never asserts itself, but is always in subordination, and acts as an accessory to the feature to which it is applied. Some of the florid ornament of the later styles, is often applied contrary to its constructive use. On the other hand, though the later carved ornament of the Dravidians does not lack in beauty, it differs as much from the Buddhist as does the Roman from the Greek.

Early South Indian Buddhist sculpture is of a severely quaint character, and is generally in basso, while the later works, with their spirited life-like scenes, are in mezzo-relievo; the carved ornament of both periods is invariably in the former. The raised surface of the objects carved, is as flat as possible, with the edges only rounded off. This style of ornament, with its soft light and shade, does not detract from the solidity of any constructive object to which it is applied. The favourite floral representations are taken from the leaves, flowers, and buds of the sacred lotus. The flower readily lends itself to an infinity of varied grouping in the hands of a skilful carver. This, and the delicacy of treatment possible with the fine-grained material used, have been fully taken advantage of. The design is occasionally strictly conventional; though in some examples a free natural treatment, or a combination of the two is adopted. Other flowers than the lotus are often employed; and the incorporation of floral designs with different animals, grotesque and otherwise, always exhibits a strikingly artistic design with faultless execution.

Plate XXXVI.

The upper portion of a carved shaft, from one of the pilasters, which separated the chaitya slabs of the inner rail. The full pilaster is shown on plate XL, fig. 3, of Dr. Burgess' work on Amarâvati.[1] The shaft, as usual, supports a chakra, and is surrounded by clinging groups of figures. It has not been considered necessary to reproduce these here. It is divided in the height by a series of moulded and sculptured bands. The exposed sections of the shaft are in a flat semi-octagon, ornamented with twisted linear designs such as those shown.

Plate XXXVII.

Ornamental bands from the piers of the outer rail. They run along at the base of the piers, forming the lowermost portion of the carving. Fig. 1 is an arrangement of lotus buds; and fig. 2 a running floral pattern, with the details somewhat abraided. Fig. 3 shows a series of zig-zags, filled with tapering bands, like an arrangement of reeds. A somewhat similar design, in circular form, appears in the above work.[2] Fig. 4 is zig-zag with the triangles filled with a bead-and-leaf pattern.

Plate XXXVIII.

Three examples of the exterior bands on the circumference of panels of the outer rail. Fig. 1 shows cherubs at play with marine animals resembling the dolphin. One cherub rides astride the animal, while another is in the act of grappling one with a hook. Figs. 2 and 3 have a running pattern of the lotus, and animals, alternately.

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[1] *Amar. and Jagg. Stûpas.*

[2] *Ibid.*, pl. XVII, fig. 2.

PLATE XXXIX.

The three figures in the plate are in continuation of each other; and represent a carved band, placed along the top of a coping stone from one of the earlier sculptures.[1] The principal flower is the lotus, in a natural arrangement of design. The carving is much frayed.

PLATE XL.

Fig. 1 a band surrounding one of the circular discs carved on a pier of the outer rail. The design is a succession of pateras encircled by wreaths.

Fig. 2 is a fragment of a stone, evidently the base of a panel. It has a simple arrangement of lotus flowers and buds. The finer details are worn off.

PLATE XLI.

Fig. 1 is a band, with foliage freely treated, from a sculptured coping panel of the outer rail.

Fig. 2 is a portion of a class of flat curved stones, described and illustrated by Dr. Burgess.[2]

PLATE XLII.

Figs. 1 and 2 are the two portions of a band along the base of a pier of the outer rail. Some of these have a makara at each end, with foliage or animals between. This example has a makara on the left, with a lotus scroll on the remainder.

PLATE XLIII.

The two portions of another specimen of the class of carved band above described.[3]

PLATE XLIV.

Two portions of a band as above noted, with animals introduced among the foliage.[4]

PLATES XLV AND XLVI.

Other two examples of the same class.[5]

PLATE XLVII.

Fig. 1 the lower portion of a sculptured panel from the outer rail. In the upper part of the panel are sculptured figures. The piece here shown is a representation of a tank with growing lotus plants, and birds standing in the water. Fig. 2, a fragment of a longitudinal panel, with a procession of hamsas.

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[1] *Amar. and Jagg. Stûpas*, pl. XXIX, fig. 2.
[2] *Ibid.*, p. 68, and pl. XXXI, fig. 2.
[3] *Ibid.*, pl. XI, fig. 4.
[4] *Ibid.*, pl. V, fig. 2.
[5] *Ibid.*, pl. V, fig. 1, and pl. VII, fig. 2.

APPENDIX.

The following note on the stones from the Bhaṭṭiprôḷu caskets, has been communicated by Dr. Warth, of the Madras Museum:

"As regards the Bhaṭṭiprôḷu relics, I have now closely examined the most important piece, the small phial which contains the three fragments of bone. The phial consists of a lightly greenish beryl crystal, hollowed out cylindrically and with a small perforation at the base.

"The crystal agrees with beryl in the following points:—

"1. Its light greenish color.

"2. Its specific gravity = 2·67.

"3. Its hardness; it scratches quartz and is scratched by corundum.

"4. The form of crystallisation, as far as the artist allowed it to remain; a prism of hexagonal section with an extra pair of faces(1).

"5. The polariscope examination. It being polished parallel to the base on both ends; the tourmaline polariscope shows clearly through the section of $\frac{1}{10}$ inches thickness the uniaxial interference figure.

"6. There are also cracks parallel to the basal cleavage.

"The lid is a small piece of quartz crystal.

"That another smaller and more bluish crystal of casket No. 2 of the following size(2)———has been proved beryl by the most decisive observations of Professor Dr. Max Bauer of Marburg University, I told you before. He found the specific gravity 2·69, and found the uniaxial interference figure to show in a direction parallel to certain characteristic internal lines.

"Four more crystals in the other caskets leave no doubt that they are also beryls. One of them is a symmetrical regular hexagonal prism, and the other a stretched one with the exact angles. The sizes are(3)———.

"The three small amethysts, which are bored lengthways are easily recognized by their colour. Their sizes(4)———.

"There is a very small colorless quartz crystal, I should say, of this size and boring(5)———of round section. Then there are two pieces of coral, this size(6)———perforated lengthways.

"The few pearls have lost their lustre.

"The quartz crystal vases from 1 to 3 inches high of clear colorless quartz you know well, and the large inscribed hexagonal prism is also of quartz perforated lengthways.

"There is one small crystal this size(7)———of yellowish color perforated lengthways. This is probably only a yellow quartz, as I was able to scratch it with a topaz."

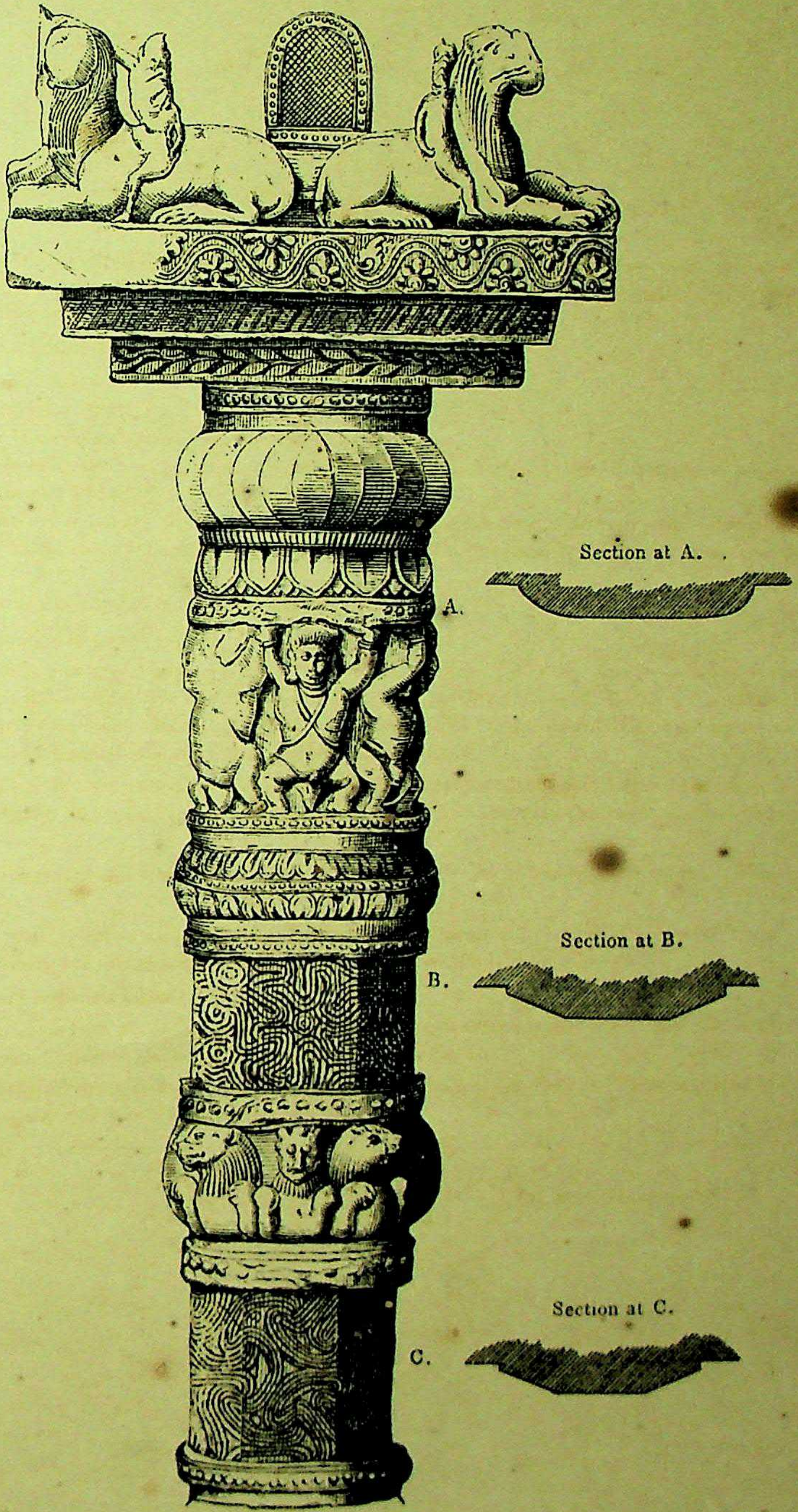
---

(1) See pl. VI. figs. 24 to 26.
(2) Pl. VI. fig. 16.
(3) Pl. VI. figs. 18, 19 and 29.
(4) Pl. VI. figs. 30 and 31 and pl. IV. fig. 10.
(5) Pl. VI. fig. 17.
(6) Pl. VI. fig. 20.
(7) Not illustrated.

AMARÂVATI.

Buddhist Marble Carving.

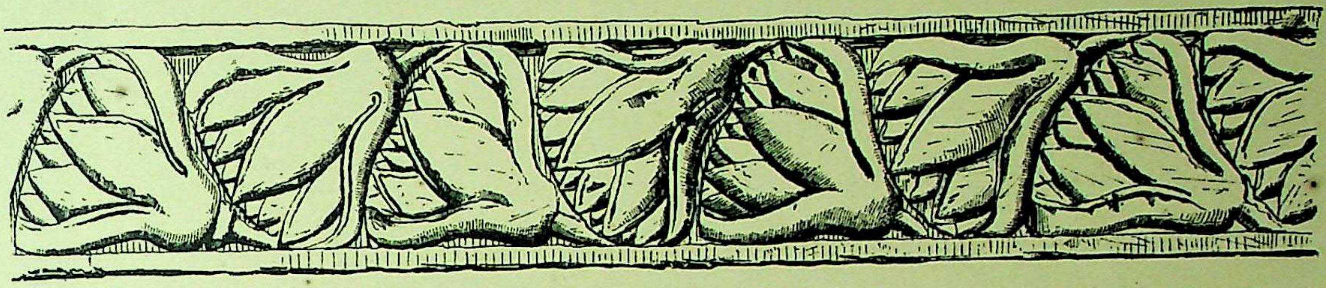
Fig. 1.



AMARÂVATI.

Buddhist Marble Carving.

Fig. 1.



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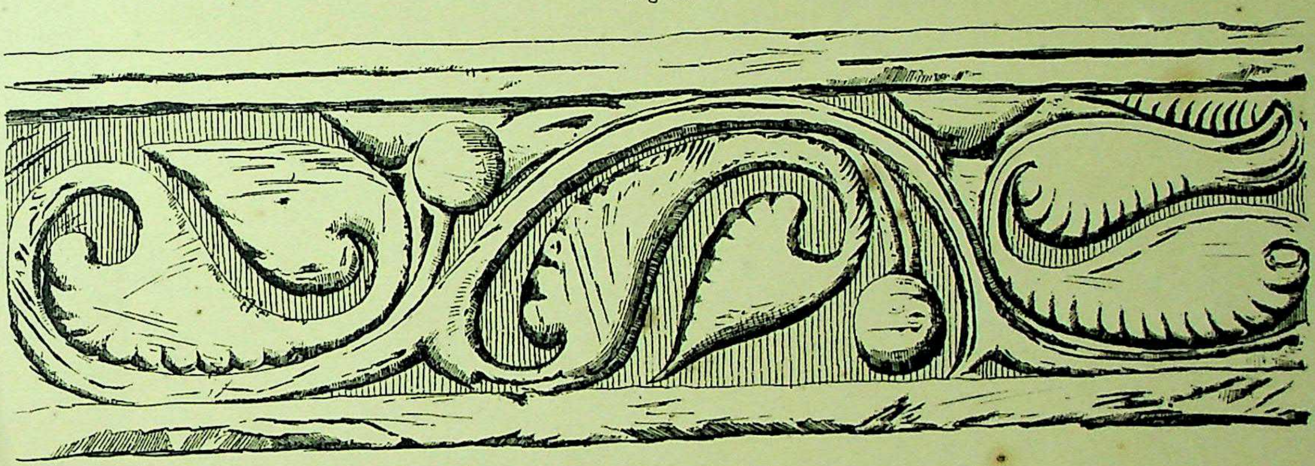

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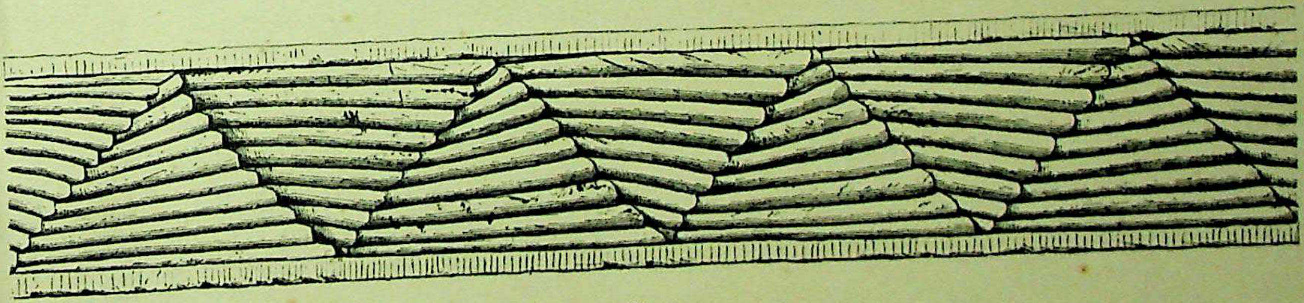
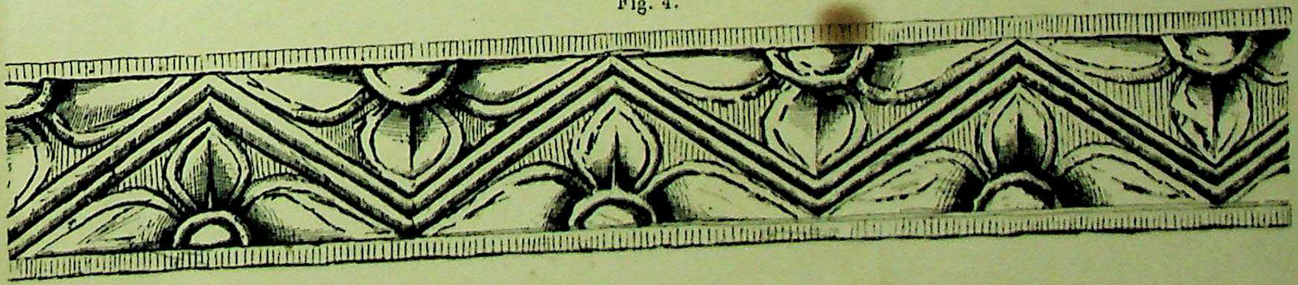


Fig. 4.



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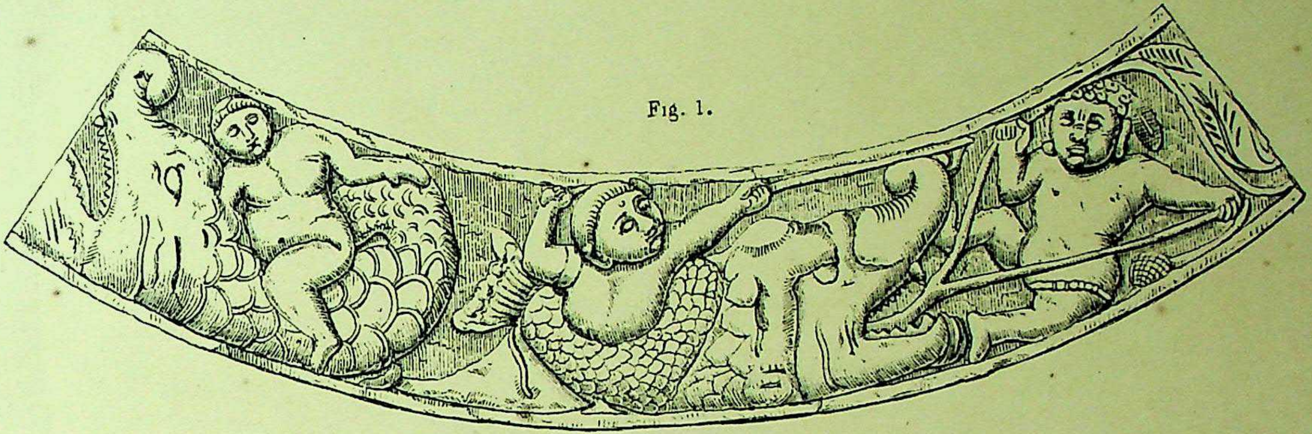
AMARÂVATI

BUDDHIST MARBLE CARVING.

Fig. 1.



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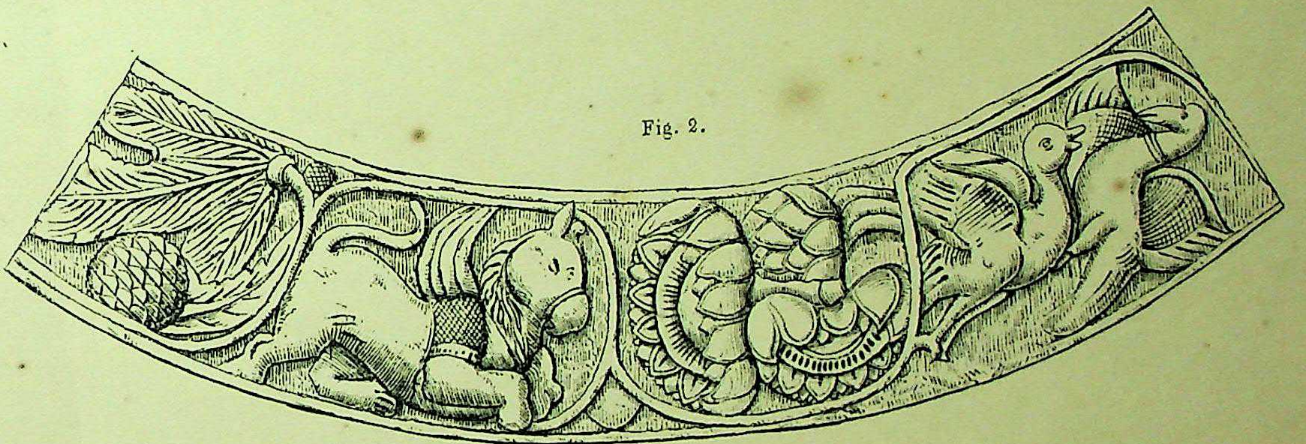

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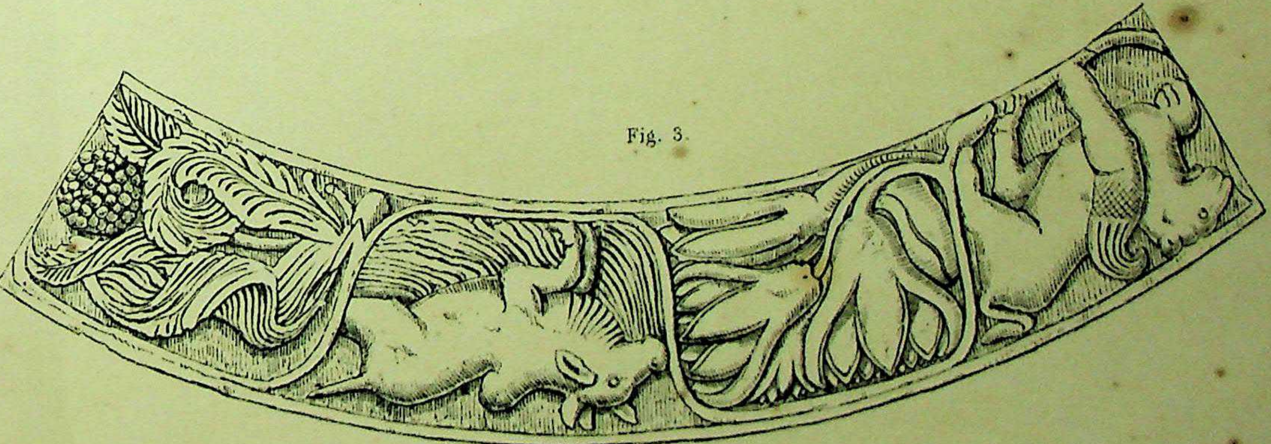

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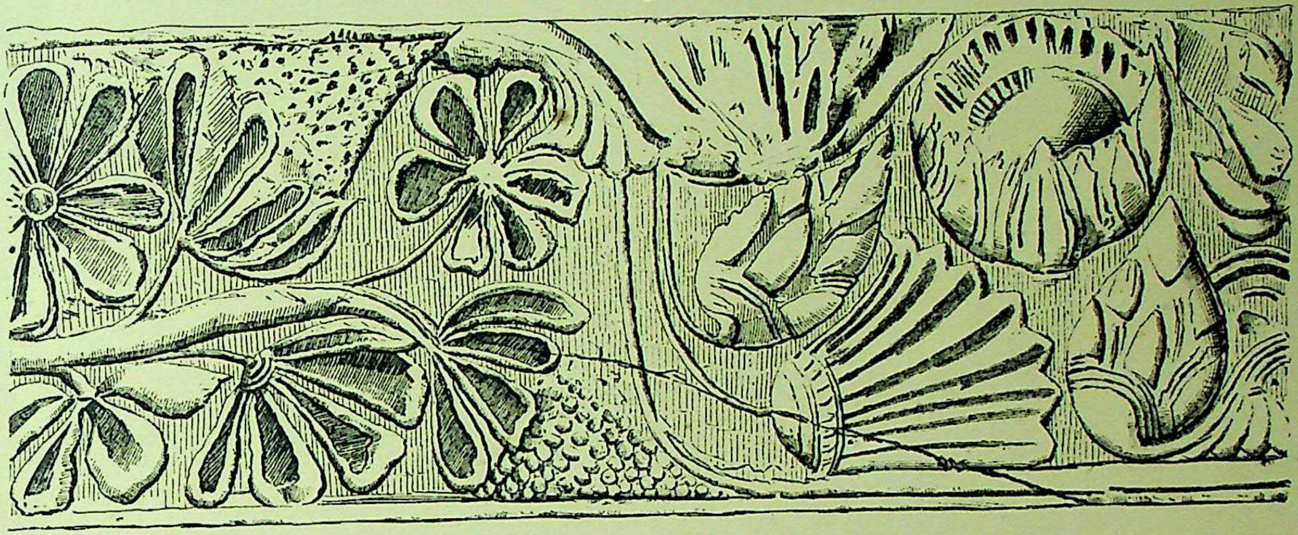
AMARÂVATI.

Buddhist Marble Carving.

Fig. 1.



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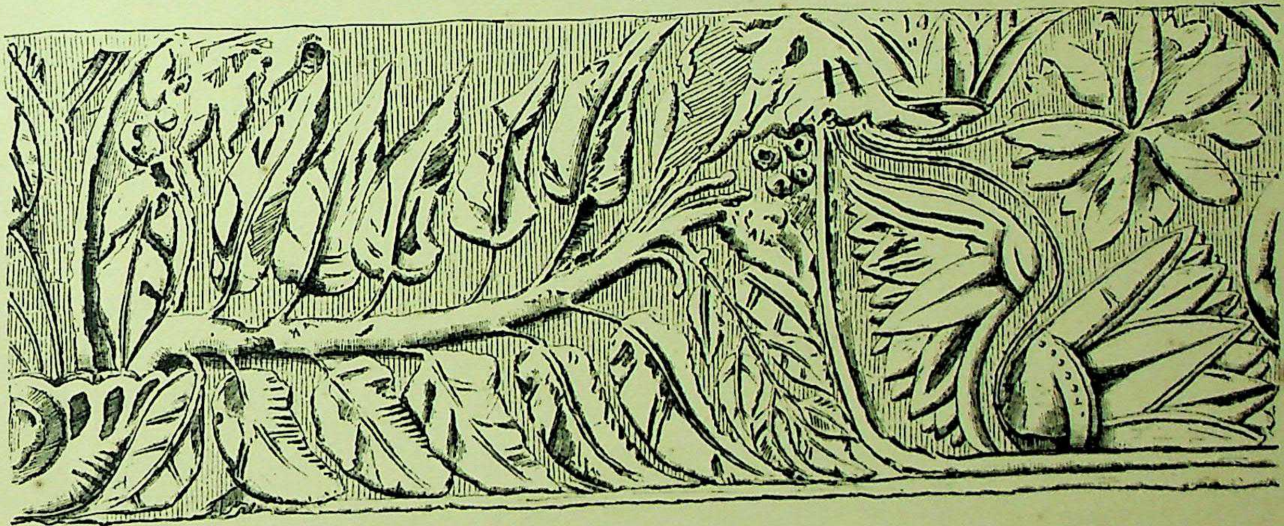

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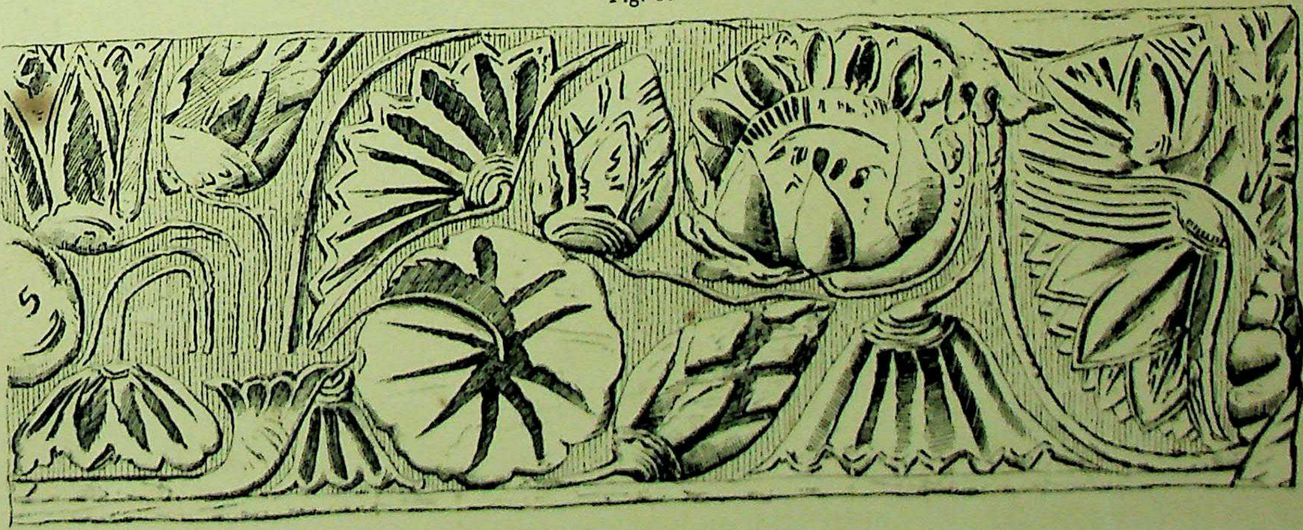
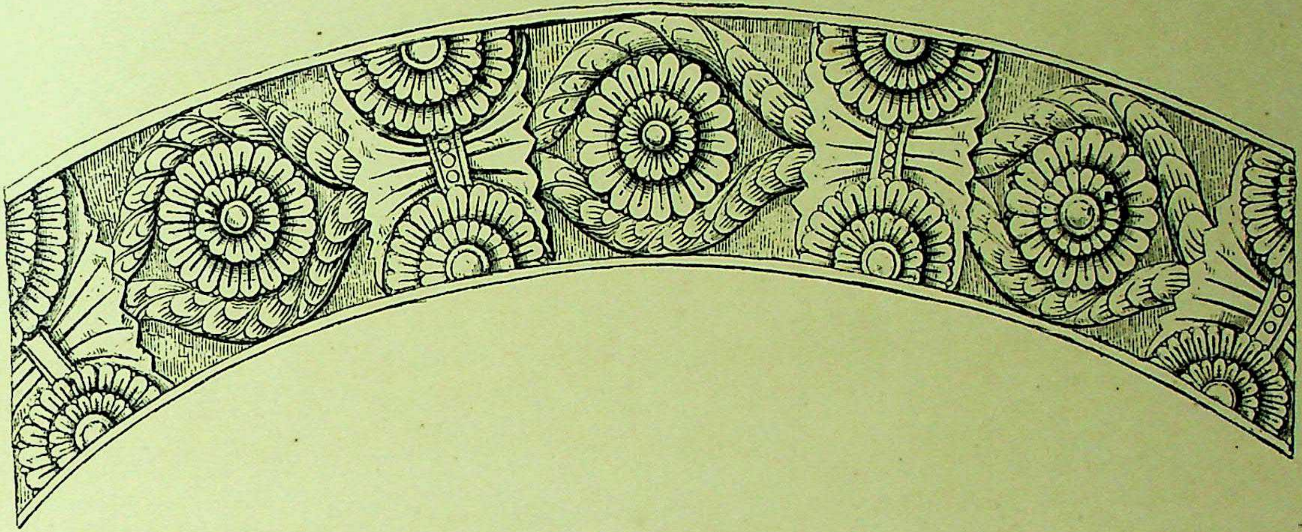


AMARÂVATI.

Buddhist Marble Carving.

Fig. 1.



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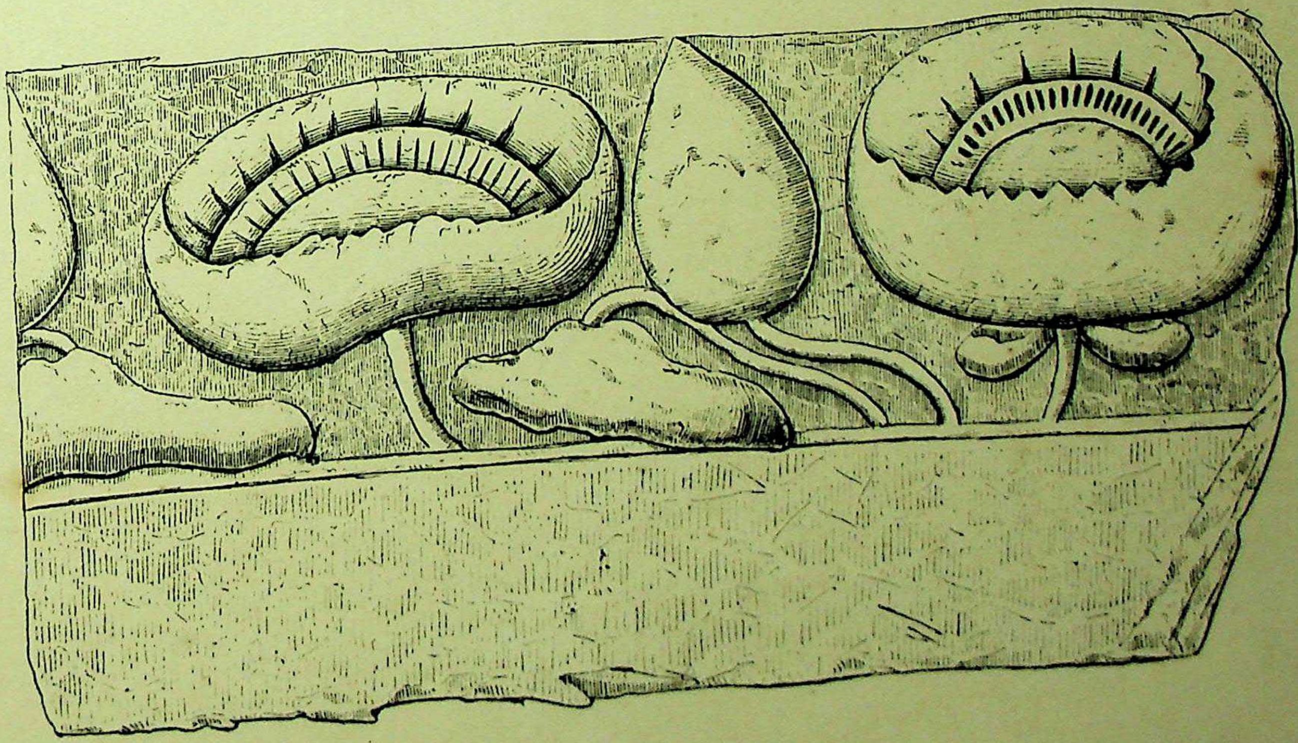


AMARÂVATI.

Buddhist Marble Carving.

Fig. 1.

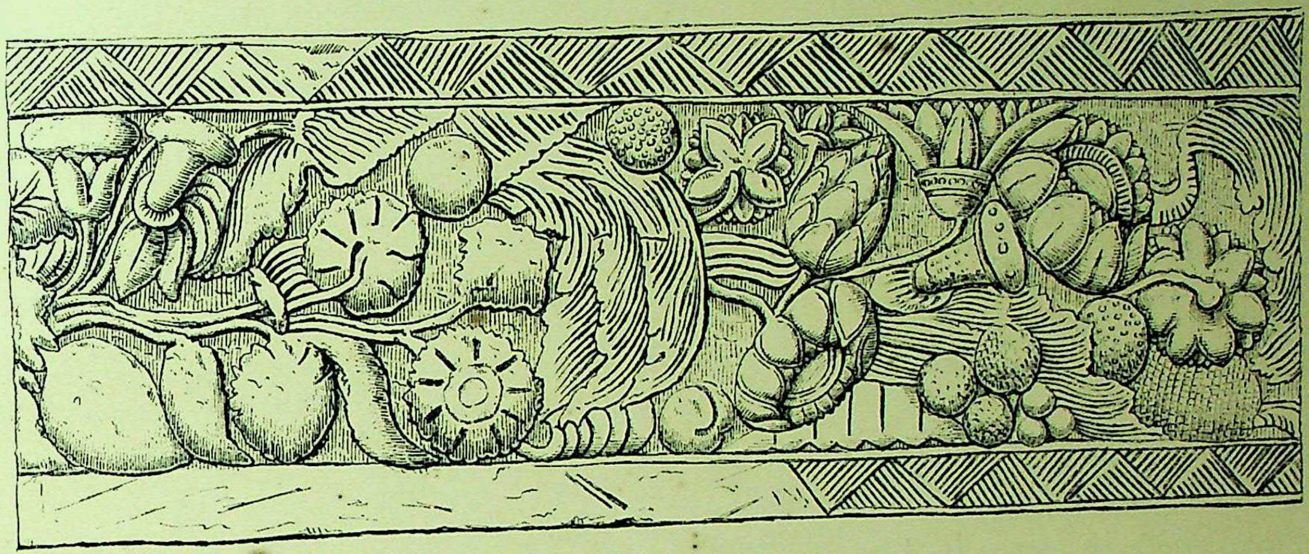
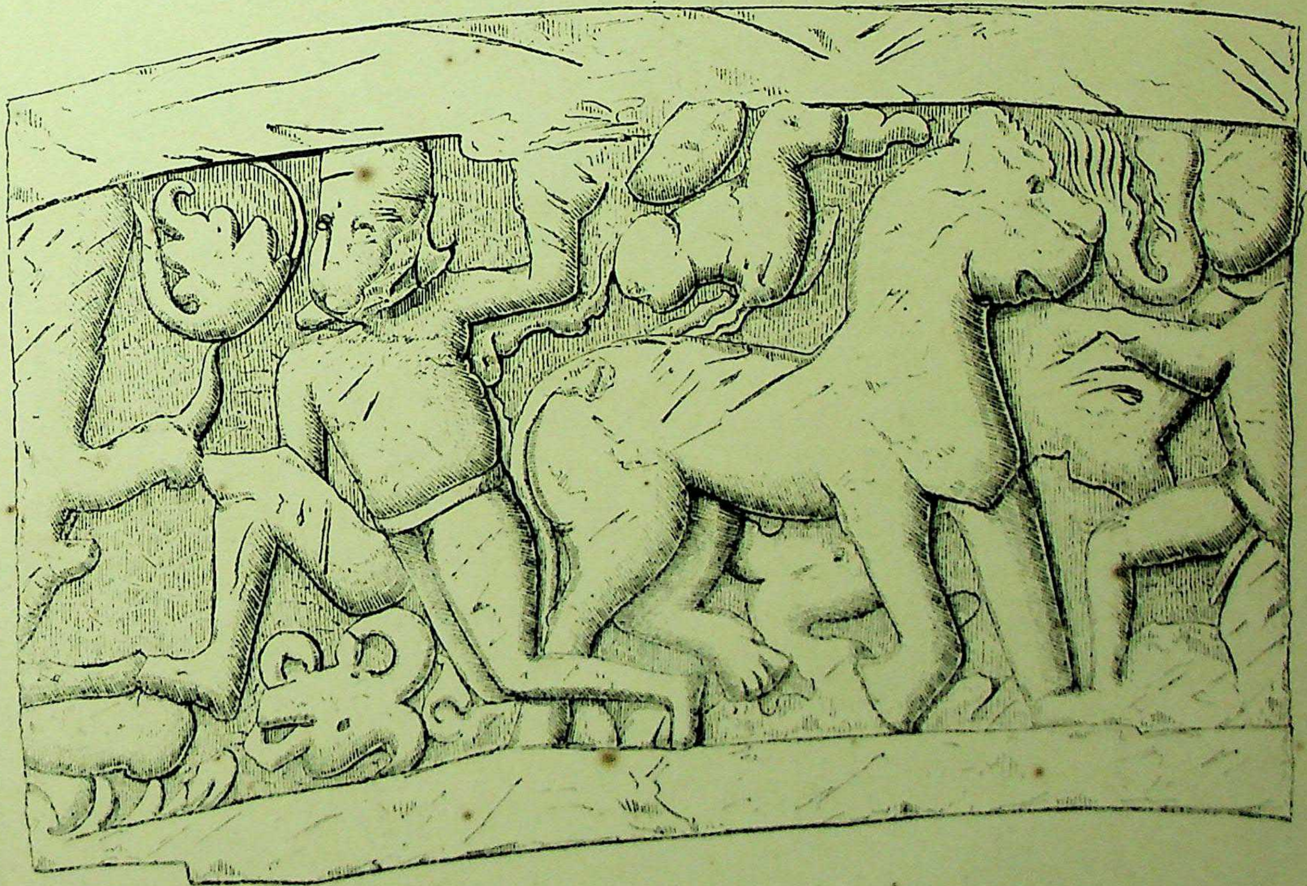


Fig. 2.



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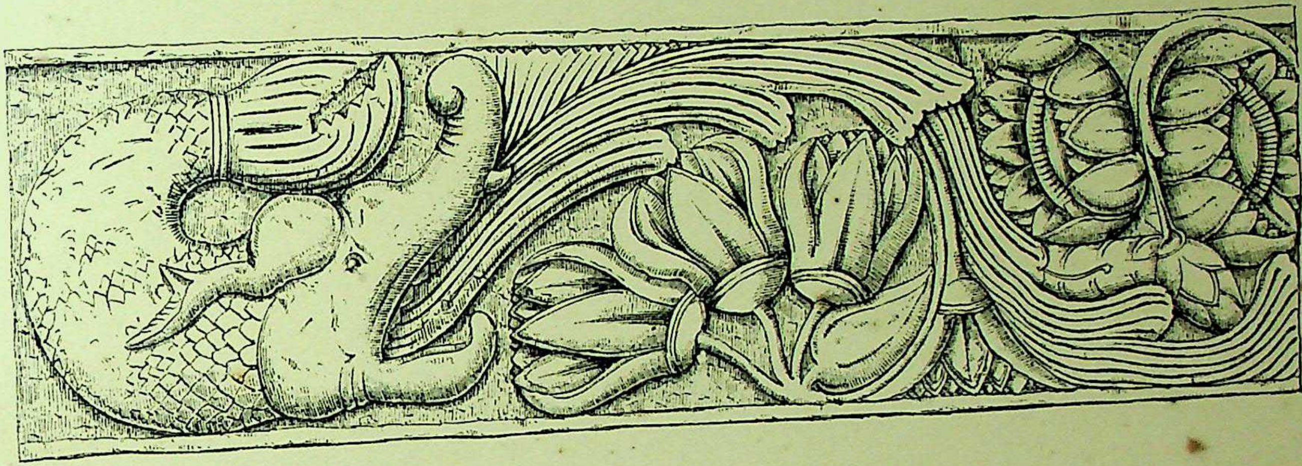
AMARÂVATI.

BUDDHIST MARBLE CARVING.

Fig. 1.



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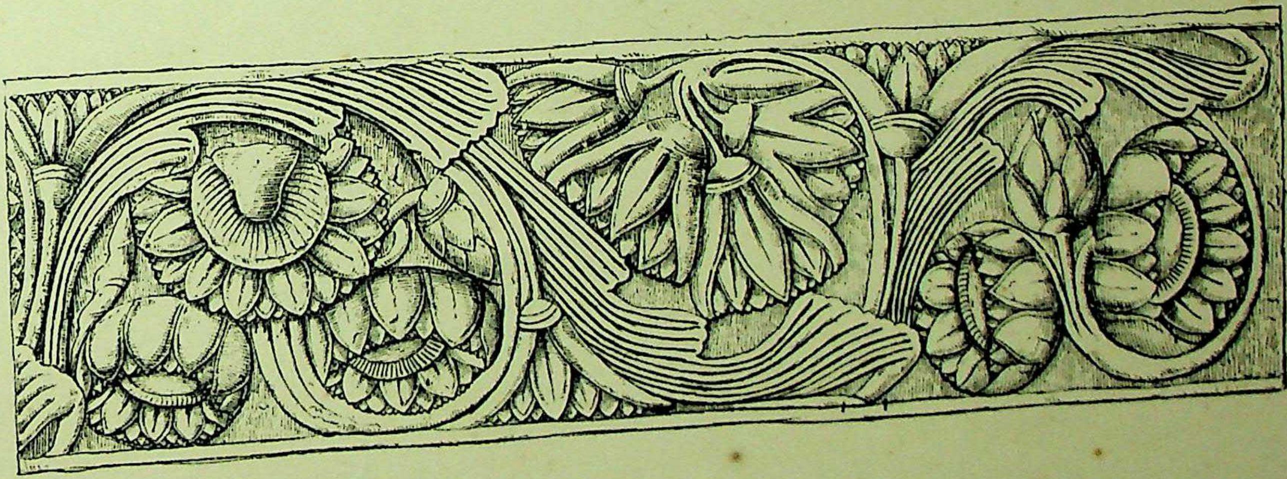

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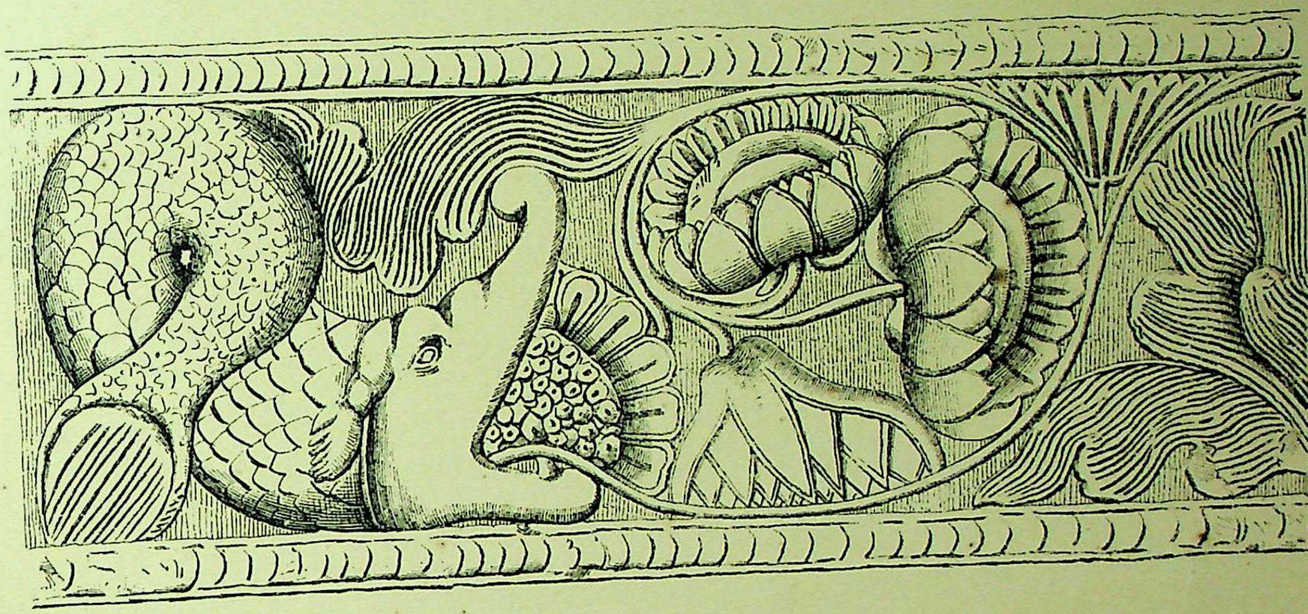
AMARÂVATI.

BUDDHIST MARBLE CARVING.

Fig. 1.



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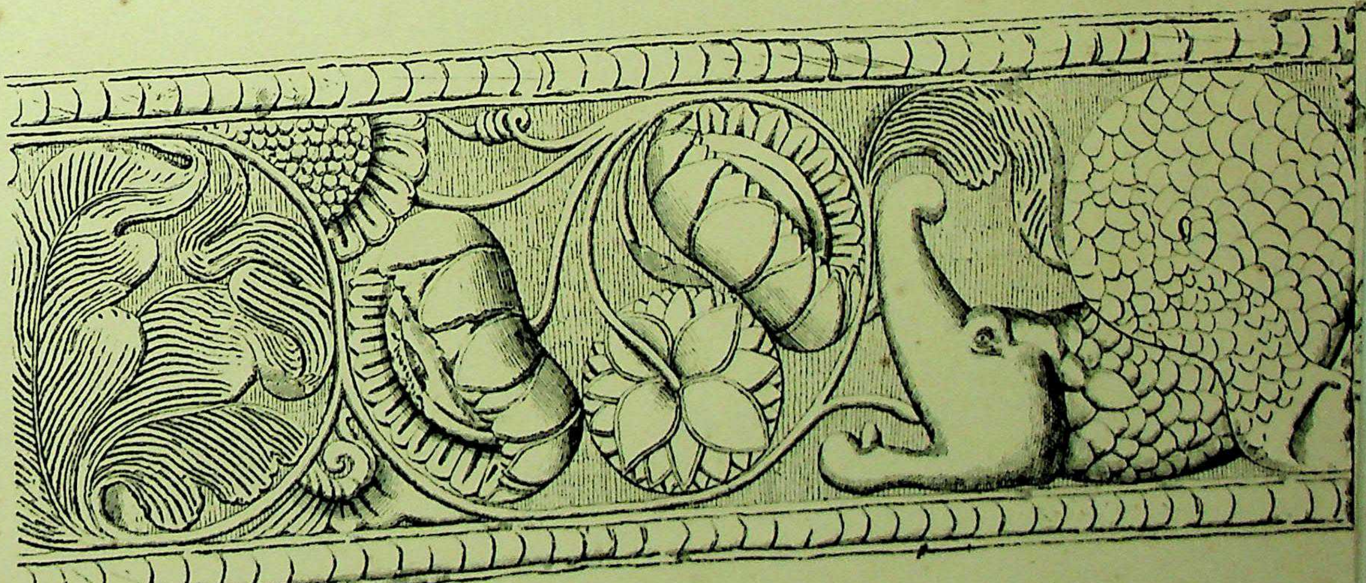

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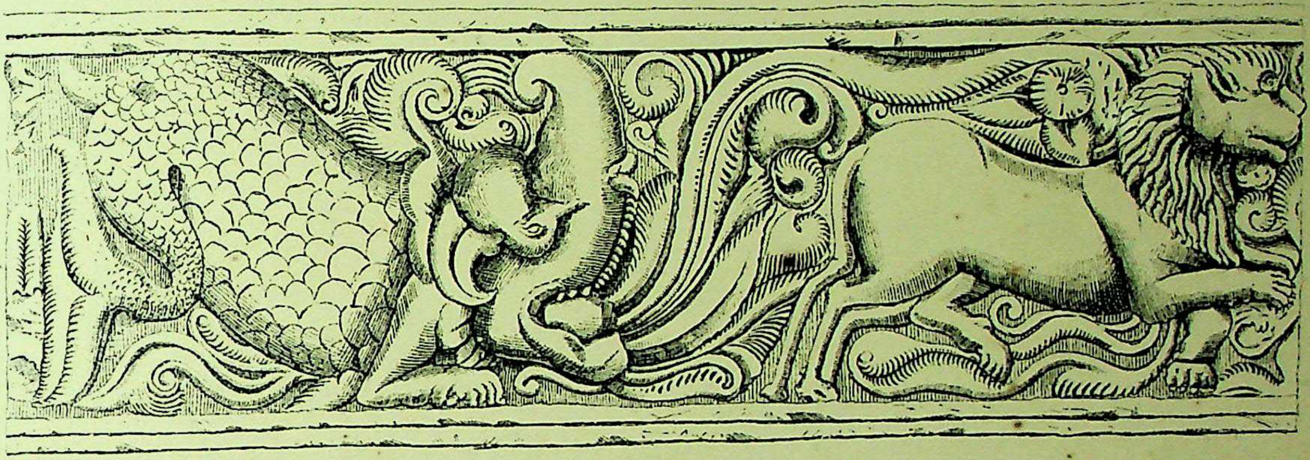
AMARÂVATI.

Buddhist Marble Carving.



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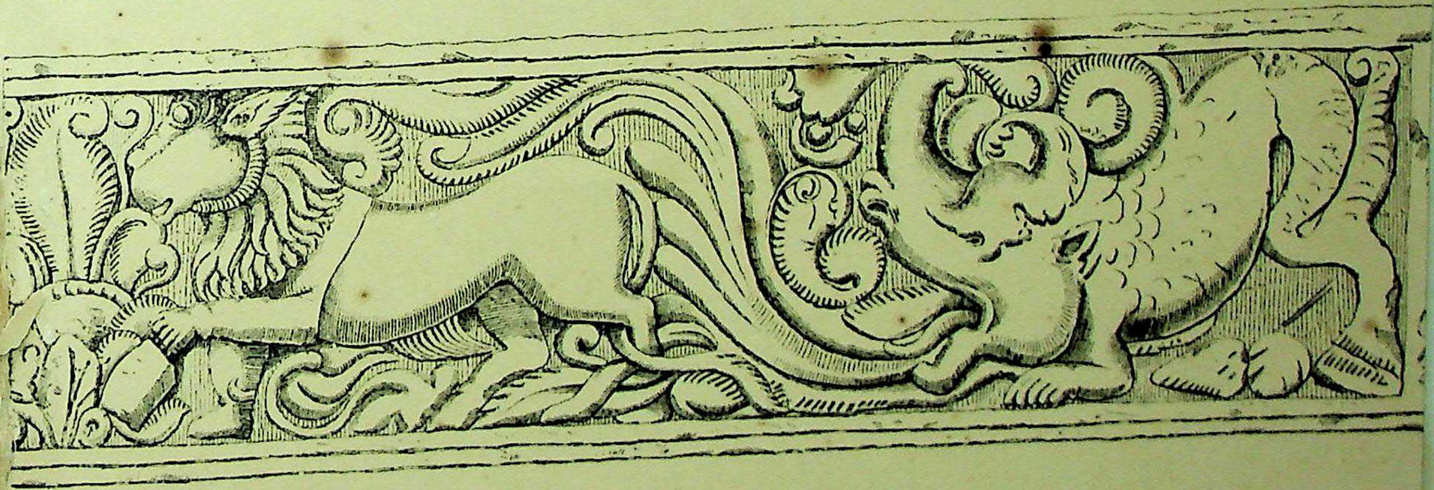

Fig. 2.

AMARÂVATI.

BUDDHIST MARBLE CARVING.

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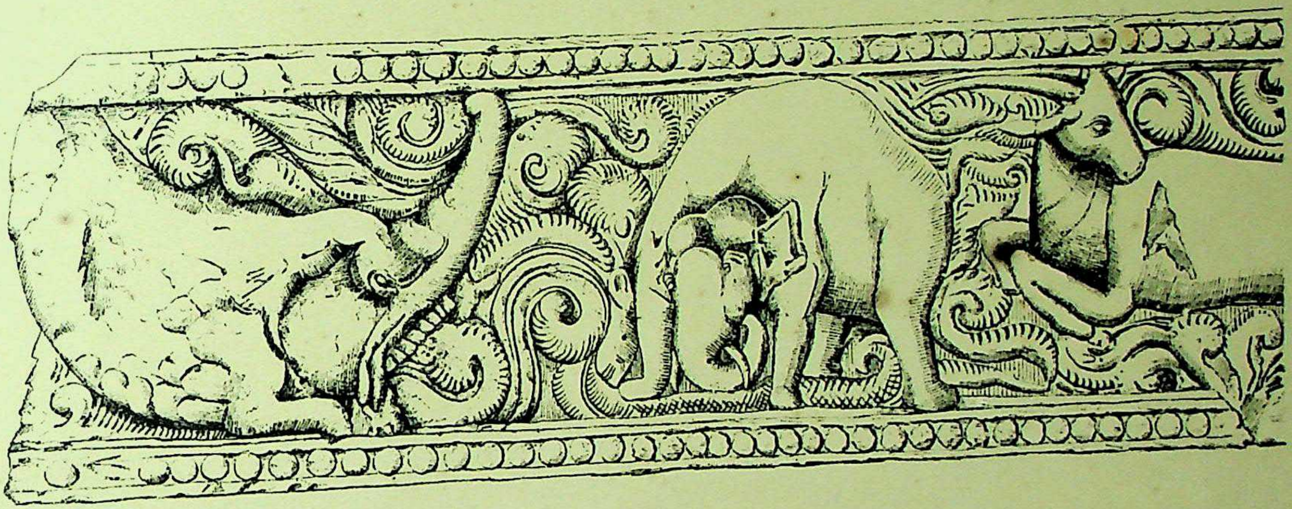

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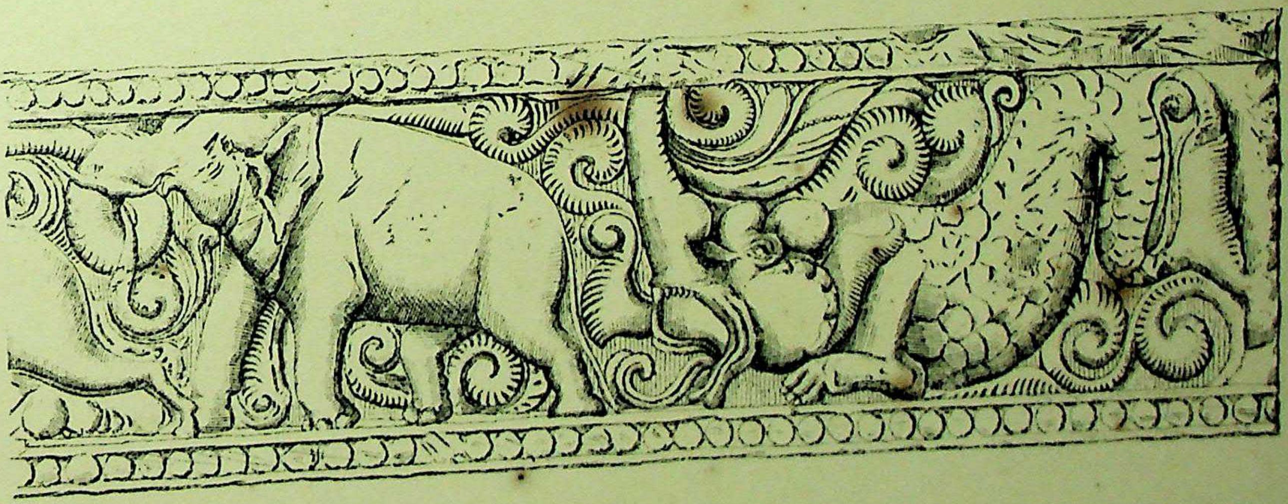
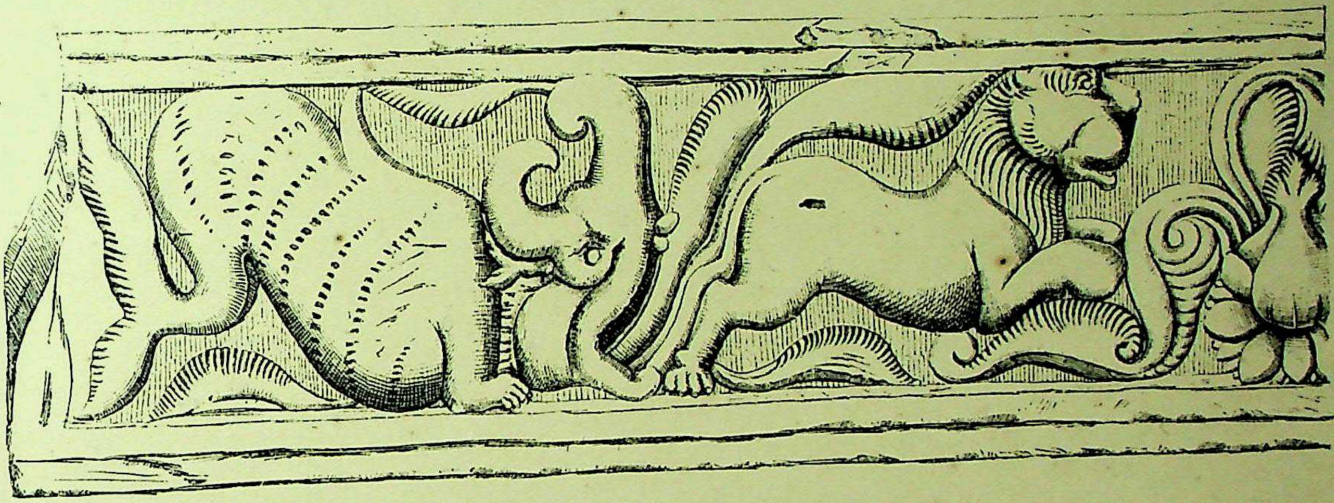


AMARÂVATI.

BUDDHIST MARBLE CARVING.

Fig. 1.



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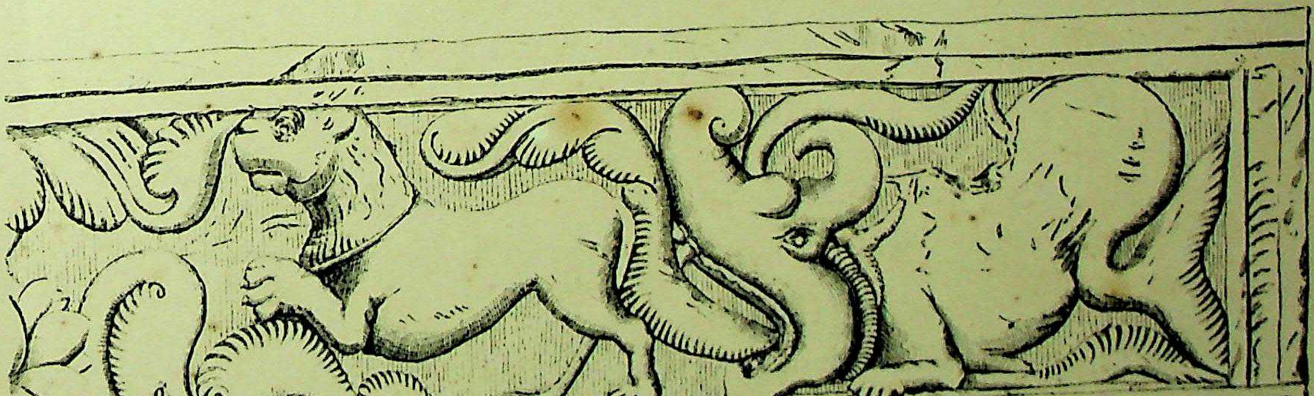

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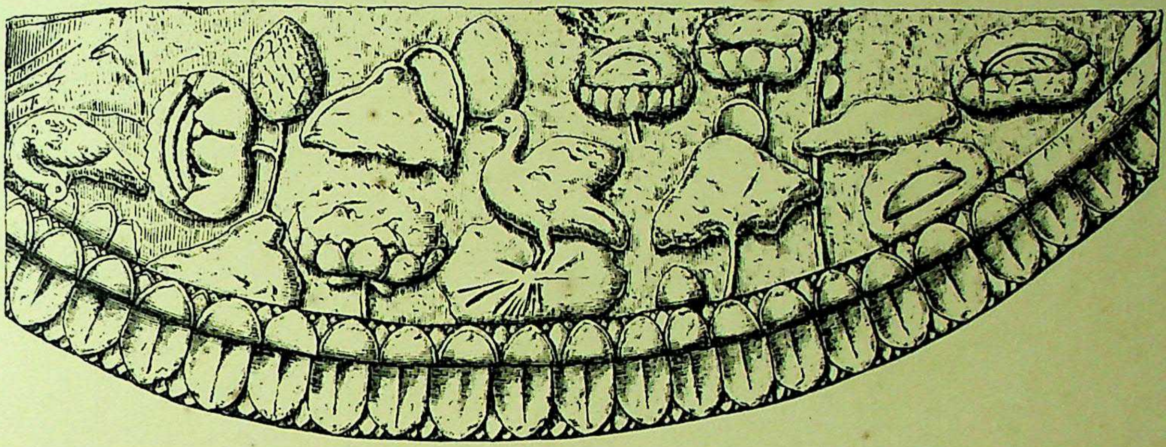
BUDDHIST MARBLE CARVING.

Fig. 1.



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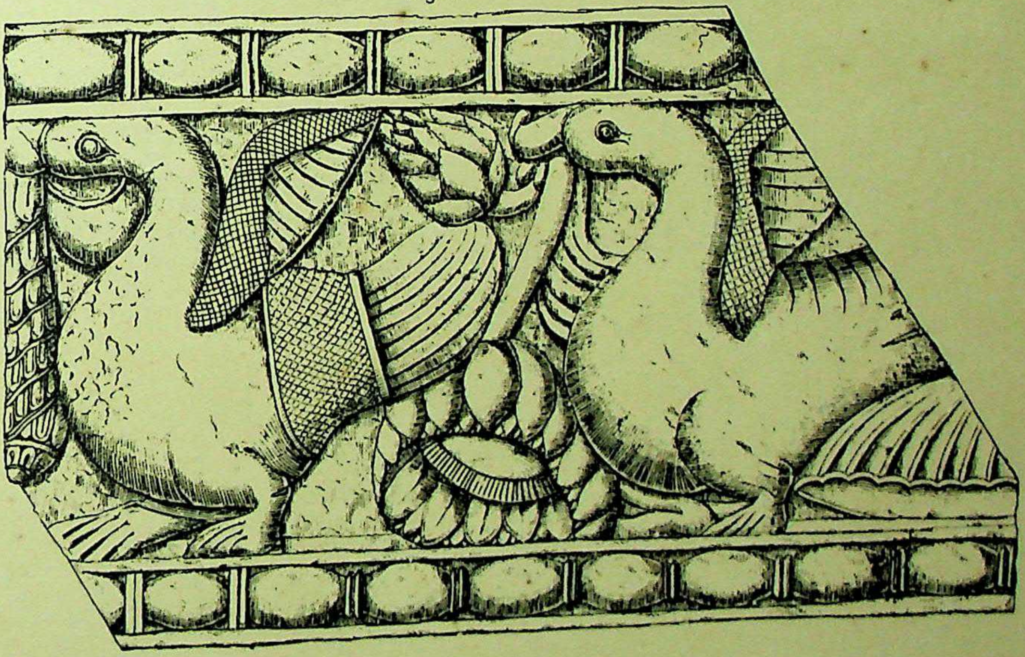

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ARCHÆOLOGICAL SURVEY OF INDIA.

NEW IMPERIAL SERIES, VOLUME XV.

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INCLUDING THE

STÛPAS OF BHAṬṬIPRÔḶU, GUḌIVÂḌA, AND GHANṬAŚÂLÂ AND OTHER ANCIENT SITES

IN THE

KṚISHṆA DISTRICT, MADRAS PRESIDENCY;

WITH NOTES ON

DOME CONSTRUCTION; ANDHRA NUMISMATICS; AND MARBLE SCULPTURE.

BY

ALEXR. REA, M.R.A.S.,

SUPERINTENDENT, ARCHÆOLOGICAL SURVEY, MADRAS.

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1894.

Śrī-Pratāpasiṁha Mahārāja Rājyābhisheka Grantha-mālā

MEMOIR No. IV

Investigations
INTO
Prehistoric Archæology of Gujarat

Being the official Report of the First Gujarat Prehistoric Expedition 1941-42

GOVERNMENT OF BARODA

By

HASMUKH D. SANKALIA

Professor of Proto-Indian and Ancient Indian History
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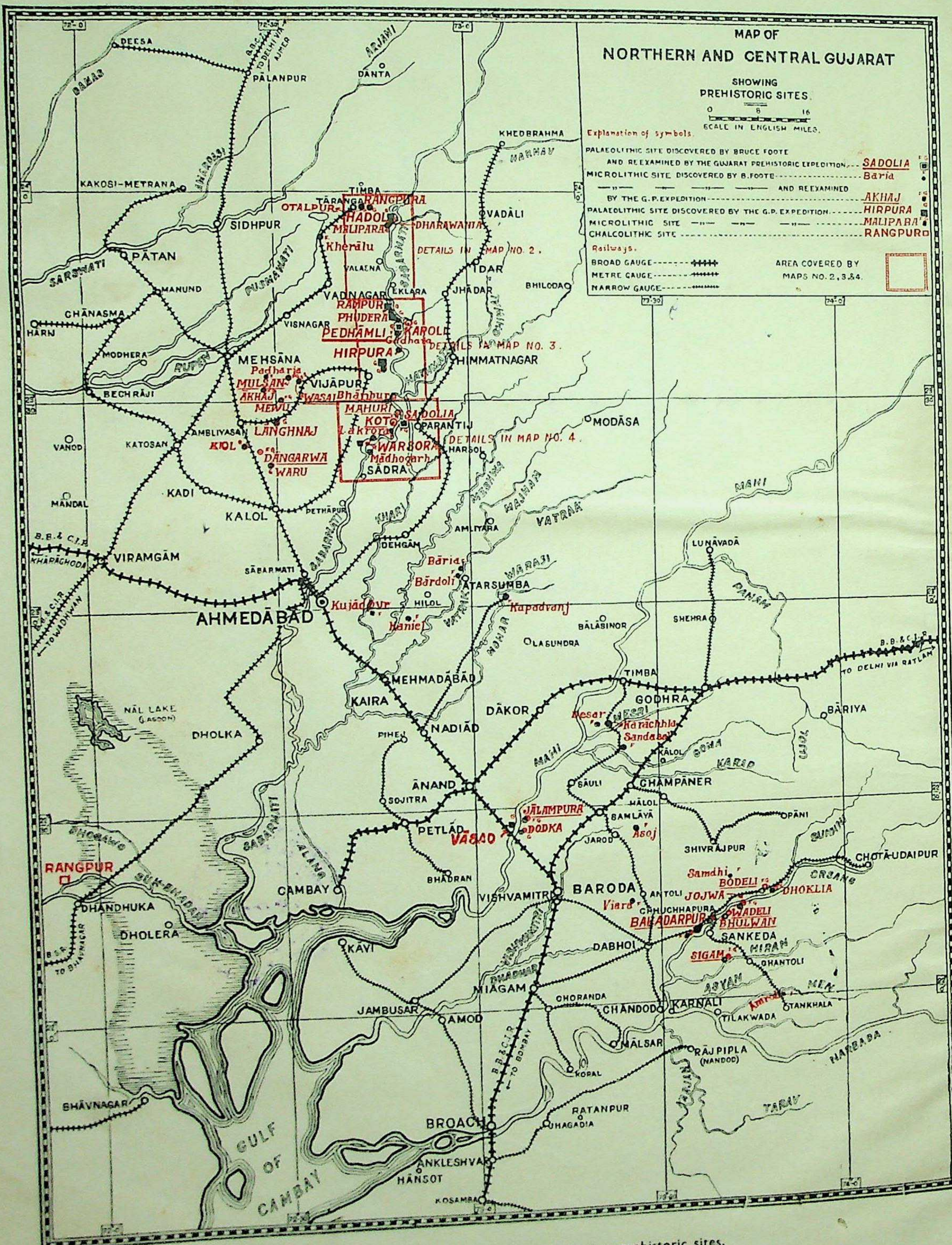
POONA

FOREWORD
By
RAO BAHADUR K. N. DIKSHIT
Director-General of Archæology in India (Retired)

Baroda State Press
1946



Map of Northern and Central Gujarat showing prehistoric sites.

Śrī-Pratāpasiṁha Mahārāja Rājyābhisheka Grantha-mālā

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CHOWKHAMBA SANSKRIT SERIES OFFICE
VARANASI

By

HASMUKH D. SANKALIA

Baroda State Press

1946

PREFACE

This volume forms the fourth Memoir of the *S'rī-Pratāpasiṁha Mahārāja Rājyābhisheka Granthamālā* Series started to commemorate the accession to the *gādi* of H. H. the Maharaja Pratapsiṁha Gaekwad in 1939. The object is to issue from time to time memoirs dealing with archæology, painting etc., in Gujarāt and the adjoining areas and, generally, all cultural movements affecting Western India.

This Memoir is an exhaustive report of the First Gujarāt Prehistoric Expedition of 1941-42 sponsored by the Director-General of Archæology in India and the Deccan College Research Institute, Poona. The first expedition was followed by two others in 1944 and 1945. Their preliminary accounts have already appeared in the *New Indian Antiquary*, Vol. VII, No. 1 (1944) and in an independent publication of the Deccan College Research Institute, Poona, (1945).

The series of expeditions under Dr. Sankalia's leadership constitutes the continuation of the spade work done by Mr. R. Bruce Foote from 1891 to 1894 when he was entrusted with the Geological Survey of the State. That Dr. Sankalia should have been enabled to follow up the trail of Mr. R. Bruce Foote after a lapse of over fifty years is indeed a matter of gratification to all the students of archæology.

The most important finds so far made are the bone implements and the skeletal remains. It has not been possible to fix the age of the bones nor has it been possible to get the bones and shells finally examined by experts for want of facilities. It seems from his account that Dr. Sankalia has succeeded in unearthing skeletal traces of the Microlithic Man in Gujarāt. It is to be hoped that his results will be corroborated by prehistorians in India and abroad. It was recently announced that a munificent donation has been made to the Deccan College Research Institute by the Sir Dorab Tata Trust for prosecuting this work further. It is hoped that Dr. Sankalia will succeed in discovering skeletal remains of the Palaeolithic Man in the Sabarmati Valley.

Reports of the second and third expeditions have been published in sketches. Dr. Sankalia will surely amplify the preliminary accounts and publish them as full-fledged reports. It will be in the fitness of things if they form part of this Series, particularly because the expeditions were confined to the Baroda State territory.

The publication of this report which was taken up in 1944 was delayed owing to difficulties of the State Press. Were it not for the interest in its early publication, evinced by Sir B. L. Mitter, the Dewan of Baroda, it is doubtful if it would have been out even now. Research scholars owe him a debt of gratitude for expediting its publication.

Baroda, 1st March 1946.

A. S. GADRE
Director of Archæology.

FOREWORD

It is a matter of great satisfaction to me that the report of the First Gujarat Pre-historic Expedition organised by me two years ago with the fullest co-operation of the Deccan College Post-graduate and Research Institute, the Gujarat Research Society, the Gujarat Vernacular Society and, above all, the Baroda State Government, is being published. The field of studies to which the work of this expedition relates has been neglected for a long time. The pioneers of research in Stone Age antiquities of India were geologists, notably Bruce FOOTE, who found the first palaeolithic implements near Madras, exactly 80 years ago, and whose extensive explorations in the Madras Presidency, Hyderabad and Baroda have not upto this day been equalled or even pursued over most of the territories covered by him. Recently the work of the Yale-Cambridge University Expedition under the leadership of Dr. De TERRA has investigated the problem of palaeolithic industries in the Punjab and elsewhere and afforded much needed stimulus for these studies. The time for organising systematic field work in some part of India seemed opportune and thanks to the facilities afforded by the Dewan Saheb of Baroda and the lead taken by keen scholars of the type of Dr. H. D. SANKALIA with the help of Mr. V. D. KRISHNASWAMI and Dr. B. K. CHATTERJEE, Gujarat became the first field of operation. The working out of the results was left solely to Dr. SANKALIA helped by Mr. A. V. PANDYA, a young scholar specially engaged for this work by the Archaeological Department.

One of the main purposes of the Expedition was to investigate the problem of the hiatus between the palaeolithic and neolithic ages as set forth by Bruce FOOTE. As a result of the work of this Expedition, it has been established that the existing material has little bearing on the problem, specially as the microlithic (not neolithic) industries unearthed in the upper deposits of the loess are entirely different from the primitive palaeolithic finds connected with the shingle beds in the Sābarmati Valley. Unless further intensive work in areas where palaeolithic and true neolithic industries were prevalent, such as the Bellary District and the surrounding regions of the Raichur District and Chitaldrug, the sequence of palaeolithic and neolithic cultures cannot be tackled with any fair measure of success. The present work gives the hope that the line of studies connected with prehistoric archaeology will be continued by Indian scholars, and will add to the scientific achievements of India.

Dr. SANKALIA's work as embodied in the following pages is of the character of a scientific study of the terrain, and the finds recovered therefrom are described and discussed in a systematic manner. I would draw special attention to Chapter IV, where the author has given a masterly survey of the Gujarat finds brought into relation with other studies from India, Africa and Europe. There is little left to be desired so far as the material and method

are concerned. Our knowledge of the oldest inhabitants of Gujarat and their physical environment has been rendered more exact as a result of the work of Dr. SANKALIA and his colleagues. The only deficiency still left in our study of this problem of the Stone Age cultures is, perhaps, the absence of any skeletal material which would indeed be a crowning achievement to nearly a century of effort in this branch. The existing material takes us to an intimate knowledge of the handiwork of the earliest inhabitants of India but not to a knowledge of their physical type or craniology, nor the contemporary fauna, which would also help to date the culture more precisely.

While palaeolithic man was confined to the banks of rivers and streams by the conditions of his existence, the microlithic culture predicates a much more civilized existence with the knowledge of making finer tools of stone and bone (discovered in Gujarat for the first time in India) for a variety of purposes in a fuller life and movements much further inland than were safe or possible for earlier man. Domestication of animals, the use of shell for utilitarian and decorative purposes and the extension of the dietary so as to include a certain amount of food grains are other characteristics of this culture, at least in its later phase which must have spread over large areas of the central uplands of the country, as also in the Deccan and Mysore tablelands where systematic research has not yet been made on a large scale. In the Mahadeo Hills a number of cave shelters have been recently dug yielding hundreds of microliths, as in the loess mounds of Gujarat. It is expected that further work in these and other localities will yield more material throwing considerable light on this phase of culture and its approximate dating in relation to other Stone Age cultures. Recent work at some sites in Mysore suggests the priority of this to the true neolithic culture but evidence from other parts indicates a somewhat different sequence. In the interest of arriving at a fairly reliable time line of Indian prehistory it is necessary that such regular scientific expeditions, as the Gujarat Pre-historic Expedition, should be started by properly trained scholars in different parts of India. In this work the various Departments of Archaeology, the universities and learned societies have a special responsibility.

Finally I must express my deep debt of gratitude to the Government of Baroda, particularly to Sir V. T. KRISHNAMACHARI, the liberal and enlightened Dewan for agreeing to publish the work at a time when other avenues were entirely closed owing to the serious paper position in the country.

Dated 27th November 1943.

K. N. DIKSHIT,
Director General of Archaeology in India.

Except for the pioneering work done by Robert Bruce FOOTE nothing definite was known about Gujarat Prehistory. He had in 1893 found four stones in the bed of the Sābarmati river which he considered the earliest artifacts in India. He had also collected from many places in Northern and Central Gujarat as well as from Kathiawar small tiny implements of agate, chert, chalcedony, jasper and rare varieties of silicate stones. Since the latter were found on the surface of small hillocks of loamy sand, (in Kathiawar on hillocks and in alluvium along river banks) and the former at a depth of 100 to 200 feet in the old bed of the river, he put forward a theory that in Gujarat a long hiatus intervened between the Palaeolithic and Neolithic Ages.

Prehistoric studies had attracted little attention of Indian archaeologists. So for a period of 50 years, no steps were taken to verify this theory. But after the discovery of the extensive Indus Culture of a proto-historic period and the establishment of the Ice Ages in the Kashmir Valley and the existence of Early Man in the "cold peri-glacial conditions" in the foothills of the Punjab corresponding to the second Ice Age in the Kashmir Himalayas, an intense desire was kindled amongst scholars to link up the historic, proto-historic and prehistoric periods of India, which hitherto stood isolated. Rao Bahadur K. N. DIKSHIT, in his Presidential address at the Anthropological Section of the Science Congress held at Madras in 1940, gave expression to this desire when he referred to the problem in Gujarat prehistory hinted at by FOOTE. The writer had similarly felt the desire of continuing FOOTE's work, after his study of Gujarat prehistoric and historic archaeology.

The First Gujarat Prehistoric Expedition was the result. It was sponsored and organised by Rao Bahadur K. N. DIKSHIT, the Director General of Archaeology in India, who approached the Deccan College Post-graduate and Research Institute of Poona, and the Gujarat Research Society of Bombay for co-operation. The Expedition was started in the cold weather of 1941–42 under the leadership of the writer with the colloboration of Dr. B. K. CHATTERJEE and Mr. V. D. KRISHNASWAMI. Its aim was threefold: first to search for the traces of Early Man, and associated fossil fauna in the river beds of Gujarat; secondly to explore by trial diggings a few of the promising microlithic sites; and thirdly to see if a correlation could be established between the material obtained from the river survey and excavations.

Since the scheme of field work was primarily based on the clues left by Bruce FOOTE, the Expedition visited first Koṭ Sāḍolia, then Hirpura, Pedhāmli and Warsora, the first three in the Vijāpur Mahal of the Baroda State. Next came the microlithic sites in the interior, viz. Mulsan, Ākhaj, Lānghnaj, Dāngarwa,

Mewu; the first three in the Mehsana Mahal, and the last two in the Kadi Mahal. This ended our work in the Baroda State in Gujarat. To survey the higher reaches of the Sābarmati we next went to Hadol in the Gaḍhwāḍ Thāna, Sābar Kantha Agency (now under Baroda), almost at the northern end of Gujarat. This work took us the best part of two months. In the little time left before the onset of summer, we thought of examining a few microlithic sites noted by FOOTE on the Orsang river in Central Gujarat. These brought us to Baroda, whence we first visited Jālampura, where a human cranium had been noticed by FOOTE; and then Bahādarpur, Wadeli, Bodeli, and Dokeriya, the last being in Chota Udaipur State, on the border of Baroda. Our tour ended after a visit to Rajpipla and thence to the famous agate mines at Ratanpura. The Expedition was disbanded in Bombay on the 15th February 1942, having been brought together in the first week of December 1941 at Vijāpur.

The method of excavation used throughout was by digging down in thin layers. At the first site, Hirpura, these layers were as small as about 3 inches only, so as not to miss any natural stratification denoted by changes in the colour of earth, apart from any structural or other evidence. When the writer was convinced that no such soil stratification existed, the digging by inches was continued but now one foot of digging constituted an artificial layer; then another foot of digging and so on. Hence the reader will observe some disparity in recording the depths at Hirpura and at Lānghnaj.

After digging a few inches at a time, the loosened earth was taken out and searched by hand. But as digging proceeded deeper, and slightly moist earth came, it was found advisable to put the earth through a sieve. Most of the finds after 2 feet – usually the tiny microliths – were collected in this way.

Both these operations were done very slowly, not more than two persons being engaged in each. Each group was supervised by an important member of the party. At the three pits excavated by the writer, Pit I at Hirpura and Pit I and Pit II Mound II at Lānghnaj, each antiquity as it was found was tied in a separate bundle and an antiquity slip prepared for it. A slightly different method was followed on Mound I at Lānghnaj. There instead of sieving the earth from a particular layer it was spread out to dry, and the antiquities were collected together in trays set aside for each layer and recorded collectively.

Though the spots selected for digging on each mound were fairly flat, a datum level was fixed with the help of a spirit level and all measurements are accurate to the nearest inch.

Most of the bones are fossilized in the sense that their porous texture has been completely permeated by calcium carbonate. And what Sir Arthur KEITH says of the skeletal remains from the Coldrum megalithic monument in Kent would be equally true of Hirpura and Lānghnaj bones: "They ring like porcelain when struck and the tongue adheres to the freshly fractured surface showing that they no longer contain animal matter." Thus the bones are considerably

old. Mr. D. N. Wadia, Mineral Adviser to the Government of India, who had kindly examined them, thinks that these bones are older than those of the Indus civilization, but younger than the Siwalik mammalian fossils, as there is no mineral replacement which is noticeable in the latter fossils.

Chemical analysis of one piece, No 632a from Lānghnaj by Dr. D. D. Karve showed that it contained in proportion to phosphoric acid 0·403 parts of fluorine. "This is slightly higher than the ratio 0·35 for diluvial bones and less than 0·64, the percentage for tertiary bones." (Cf. Martin, *Lehrbuch der Anthropologie*, 1928, part 1, p. 34). Thus the view as to the antiquity of the bones would get further support, but unfortunately there is no data from India of the type gathered by Martin, with which we can compare our results. Hence no definite opinion as to age of the bones can be pronounced at this stage of our investigation.

For want of facilities the bones and shells could not be sent to experts in and outside India, so that it has not been possible to determine the exact species of the vertebrate and invertebrate animals contemporary with the microlithic culture. The identifications given in the Report are therefore provisional.

The work was mainly confined to H. H. the Gaekwad of Baroda's territories in Gujārat. A special acknowledgment is therefore due to the Baroda Government, particularly to its enlightened Dewan, Sir V. T. Krishnamachari, who not only readily acceded to Rao Bahadur Dikshit's and the writer's request for permission to conduct explorations in the State, but arranged for a number of facilities to the Expedition, and sanctioned the publication of the Report in the *S'rī-Pratāpsiṁha-Mahārāja Rājyābhisheka-granthamālā Series.* He also deputed Mr. A. S. Gadre, a member of the Baroda Archaeological Department (now its Director) to work with the expedition. Mr. Gadre's assistance was of much value. He was in charge of excavation at one mound at Langhnaj, and facilitated contact with local officials, who looked after the needs of the party. Mr. Gadre also deserves thanks of the writer for making some valuable suggestions, while going through the final proofs, and seeing the Report through the Baroda Government Press. Amongst the officials our thanks are specially due to Mr. J. N. Ambegaokar, the Vahivatdar of Vijāpur Mahal, and other officers of the Vijāpur, Kalol and Sankheda Mahals of the State.

An acknowledgment is also due to the Resident, Sabar Kantha Agency for granting permission to conduct exploration at Hadol; to the Thakor Saheb and Kumar Saheb of Hadol and Mr. H. D. Udani, the Thandar of Gadhwād for their hospitality during our stay there; also to Messrs. M. M. Prajapati and L. R. Bhatt of the Hadol School for their assistance.

We must also appreciate the readiness with which the Dewan of Rajpipla State, Khan Bahadur P. D. Kothawala, facilitated our visit to the agate mines at Ratanpura and other places of historic interest in the State through State officers, particularly Messrs. A. D. Bhot, L. V. Mehta and M. H. Pandya, who showed a keen interest in our work and made our visit comfortable.

Professor G. H. BHATT of Baroda and Prof. K. T. MERCHANT and Mr. B. D. PATEL of Ahmadabad deserve our thanks for their hospitality during our stay at these places.

The writer is grateful to Prof. Dr. A. S. KALAPESI of St. Xavier's College, Bombay and Prof. Dr. G. M. KURULKAR of Seth Gordhandas Sundardas Medical College, Bombay, for visiting Poona and advising the writer on the geological, and anatomical character of stone artifacts and of bone finds respectively; to Prof. K. V. KELKAR of the Fergusson College, Poona, for his help in identifying the shells and the elucidation of matters connected with soil samples; and to Prof. Dr. J. A. DAJI, Agricultural Chemist to the Government of Bombay for kindly undertaking the examination of soil samples collected by the Expedition (his report on these is appended at the end); to Dr. Mrs. Iravati KARVE, the writer's colleague in the Institute, for identifying with the assistance of Prof. A. H. KHAN of the Veterinary College, Bombay, the important bone material, and thus enabling us to know something of the fauna of the microlithic period in Gujarat; to Dr. D. D. KARVE for undertaking the chemical analysis of bones; to Mr. D. N. WADIA, at present Mineral Adviser to the Government of India, for enlightening us on the nature of fossilization of the bones; to the Director, Zoological Survey of India for kindly identifying the shells.

The writer is grateful to Mr. Q. M. MONEER, Superintendent, Archaeological Survey, Western Circle, Poona, for the assistance rendered by him in various ways; to Mr. J. N. JOGLEKAR of the same office for photographing the finds and helping in arranging the plates.

The writer is indebted to the University of Bombay for a research grant which enabled him to meet the laboratory expenses, as well as to visit the Government Museum, Madras, for studying its prehistoric antiquities and to Dr. A. AIYAPPAN and Dr. R. K. REDDY, the Superintendent of the Madras Museum and the Curator of the Anthropological Section respectively for granting all facilities for study.

The writer would also like here to thank the various members of the Expedition for their co-operation: Mr. Devi Dayal MATHUR, the Head Photographer of the Archaeological Survey of India, Messrs. A. V. NAIK and D. R. PATIL, two research students of the Institute who joined the Expedition at different intervals, and the Exploration Jamadar Sadar Din.

Among the writer's associates Mr. V. D. KRISHNASWAMI deserves a special mention. His enthusiasm and thoroughness were admirable. Very often the writer was successfully guided by his advice on the field. It is indeed a pity that his services were not available in the writing out of the Report. It cannot be denied that certain parts of chapter II have suffered in the absence of his co-operation. Dr. B. K. CHATTERJEE, whose zeal for discovering fossilized remains was unfortunately unrewarded, contributed considerably to the collection of tools.

Mr. A. V. PANDYA, who joined the Expedition on behalf of the Gujarat Research Society and the Gujarat Sahitya Sabha, Ahmadabad, proved a very zealous and useful worker in the field. He also showed these qualities when he joined the writer as a Technical Assistant on behalf of the Government of India. All the drawings and maps have been made by him under the writer's direction. He also assisted the writer in compiling the Catalogue of microlithic finds as well as in getting references from works and journals. It is gratifying to learn that Mr. PANDYA is now employed as the State Archaeologist in Rajpipla, where he is expected to advance the work of the Expedition.

The Chairman Mr. (now Sir) R. P. MASANI, and the Council of Management of the Deccan College Post-graduate and Research Institute granted the writer's application to co-operate with the Government of India in sponsoring the Expedition and sanctioned the extra expenses incurred and the leave of absence in connection with it for which the writer is indeed greatly obliged. He would also thank the ex-Director, Dr. I. J. S. TARAPOREWALA, and the present Director, Dr. S. M. KATRE for affording all facilities and encouragement for carrying on this work.

Owing to the War the writer was unable to get a number of books on the subject, nor was he able to study, as he wished, the important collection in the Indian Museum at Calcutta. The last chapter, consequently, may not be up-to-date in certain particulars. Most of the books for this as well as the first chapter were obtained from the libraries at Bombay, Baroda, Madras and Delhi. The writer's thanks are hence due to the librarians of these respective centres, but particularly to Dr. P. M. JOSHI, the Librarian of the Bombay University and Rev. H. HERAS, S. J., St. Xavier's College, Bombay, for their ready help and co-operation; to Dr. S. M. KATRE, Dr. M. G. DIKSHIT and Dr. D. R. PATIL for helping to prepare the manuscript and plates for Press, and finally to the Baroda Government Press.

Dated 24th September 1945.

H. D. SANKALIA.

Deccan College Post-graduate
and
Research Institute, Poona.

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(c) Pit 1, Mound II, LANGHNAJ with a large fossilized bone (long bone of a mammal) *in situ*.

(d) Loess deposits on the TARANGA HILL.

IMPLEMENTS (PHOTOGRAPHS)

Pl. V 1–5 (1), 2–6 (4) flakes from KOT; 3–7 (7), 4–8 (6) flake and cleaver-cum-hand axe from HIRPURA, 9-12 pebble-tools from HIRPURA; 13–14 (245), 15 (243), 16 (244a) flake and hand axes from WARSORA*

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1–5 (25), 2–6 (28), 3–7 (37), 4–8 (30), 9 (27), 10 (32), 11 (35), 12 (38).

Pl. VII HAND AXES FROM GRAVEL, PEDHAMLI

1 (55), 2 (77), 3 (230), 4 (201), 5, 9 (52), 6, 10 (130), 7, 11 (181b), 8, 12 (66a),
13 (126), a rostrocarinate type from Gravel-Alluvium Junction
14 (143), a short cleaver Do

Pl. VIII IMPLEMENTS FROM PEDHAMLI

1 (195), 2 (58) cleavers; 3 (210), 6 (60) core, 4 (68), 5 (147) flake from Gravel
7 (226a), 8 (132), 9 (131), 10 (129), 16 (85) hand axes from Junction
13 (224), 14, 15 (74), cleavers from Alluvium

*Figures in brackets after the number of figures in the plate indicate the catalogue number of the implement illustrated.

Pl. IX IMPLEMENTS FROM PEDHAMLI

1, 5 (173), 3, 7 (170), 8 (172) discoid (cores) from Junction
2, 6 (241), 4 (159) flakes from Junction
9, 13 (113), 10, 14 (122), 11, 15 (76), 12, 16 (182) flakes from Alluvium

Pl. X IMPLEMENTS: HAND AXES FROM ALLUVIUM, PEDHAMLI

1 (75), 2 (134), 3 (50), 4 (180), 5-6 (178), 7-8 (226a),
9 (71), 10 (225), 11 (69), 12 (70), 13-14 (82), 15 (51), 16 (76)

Pl. XI (a-b) IMPLEMENTS FROM HADOL; (c-d) IMPLEMENTS FROM BAHADARPUR

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9-10 (295), 11 (300) hand axes; 12 (291) pebble tool; 13-14 (309), 15 (289), 16 (282) flakes

Pl. XII IMPLEMENTS FROM THE KARJAN VALLEY

1, 2 choppers; 3 (14) discoid; 4-5 (10), 8-9 (12), 12, 14 (9) cleavers; 6 (8), 7 (11), 10-11 (7), 13 (6) hand axes

Pl. XIII SURFACE MICROLITHS: NATURAL SIZE

(a) Cores and Core flakes; (b) Large flakes and Neolith-like piece (No. 17)
1 (311), 2 (793), 3 (119), 4 (108), 5 (106), 6 (11), 7 (12), 8 (74), 9 (483), 10 (124), 11 (232), 12 (15A), 13 (120), 14 (330), 15 (313), 16 (301), 17 (225), 18 (178)

Pl. XIV SURFACE MICROLITHS: NATURAL SIZE

(a) Long, thin and broad 2-edged flakes; (b) Crescent or worked-back flakes
1 (16), 2 (138), 3 (500), 4 (235), 5 (582), 6 (136), 7 (234), 8 (191A), 9 (815), 10 (836), 11 (26), 12 (134), 13 (369), 14 (819), 15 (847), 16 (24A), 17 (139), 18 (173), 19 (225D), 20 (220B), 21 (37), 22 (225E), 23 (147), 24 (466), 25 (514), 26 (?), 27 (557), 28 (259), 29 (246), 30 (676), 31 (163), 32 (534), 33 (187), 34 (172A), 35 (158)

Pl. XV SURFACE MICROLITHS: NATURAL SIZE

(a) Flakes (Scrapers), (b) "Points" and "Discs" or "Core-trimmings"
1 (191B), 2 (182), 3 (264A), 4 (198), 5 (77A), 6 (201), 7 (667), 8 (264), 9 (225C), 10 (76), 11 (225B), 12 (216), 13 (93), 14 (267), 15 (224), 16 (221), 17 (424), 18 (425), 19 (592), 20 (628), 21 (70), 22 (68A), 23 (209)

Pl. XVI EXCAVATED MICROLITHS FROM HIRPURA

Cores, Core-flakes, Flakes and "Points". Slightly enlarged

1 (279), 2 (308), 3 (40), 4 (294), 5 (155), 6 (307), 7 (31), 8 (411), 9 (152), 10 (196), 11 (537), 12 (159), 13 (302), 14 (50), 15 (157), 16 (153), 17 (44), 18 (288), 19 (564), 20 (521), 21 (184), 22 (336), 23 (165), 24 (315)

Pl. XVII EXCAVATED MICROLITHS FROM LANGHNAJ

Small and large 2-edged flakes, Crescents & "Points". All of almost natural size
1 (224), 2 (750), 3 (515), 4 (508), 5 (394), 6 (700), 7 (371), 8 (495), 9 (14), 10 (22), 11 (111), 12 (203), 13 (483), 14 (478), 15 (868), 16 (393), 17 (811), 18 (934), 19 (480), 20 (812), 21 (484), 22 (940), 23 (241), 24 (873), 25 (32), 26 (306), 27 (26), 28 (387), 29 (23), 30 (7), 31 (641), 32 (870), 33 (496), 34 (876), 35 (295), 36 (481), 37 (277), 38 (684), 39 (814), 40 (339), 41 (391), 42 (691), 43 (229), 44 (7), 45 (74), 46 (75), 47 (683), 48 (759), 49 (500).

Pl. XVIII (a) EXCAVATED MICROLITHS FROM LANGHNAJ

Cores, " Core Trimmings, large and small two-edged flakes: Natural size

1 (612), 2 (228), 3 (21), 4 (649), 5 (195), 6 (364), 7 (130), 8 (505), 9 (132), 10 (227), 11 (59), 12 (742), 13 (559), 14 (718), 15 (654), 16 (392), 17 (474).

(b) POTSHERDS FROM EXCAVATIONS AT HIRPURA & LANGHNAJ.

No. (92) Torso of a figurine

Pl. XIX BONE TOOLS FROM EXCAVATIONS AT HIRPURA & LANGHNAJ.

NATURAL SIZE

IMPLEMENTS (DRAWINGS)

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Flakes and small ovate hand axes

1 (1), 2 (244), 3 (243), 4 (4), 5 (7), 6 (241), 7 (245), 8 (2), 9 (281), 10 (267), 11 (113), 12 (159), 13 (260), 14 (210), 15 (279), 16 (259), 17 (192), 18 (289), 19 (311), 20 (300), 21 (314), 22 (307)

Pl. XXI PALAEOLITHIC IMPLEMENTS FROM GRAVEL & GRAVEL JUNCTION

Ovate, oval, pear-shaped, and triangular types of hand axes & cleavers

1 (6), 2 (25), 3 (30), 4 (28), 5 (27), 6 (58), 7 (139), 8 (53), 9 (66a), 10 (130), 11 (136), 12 (181), 13 (179), 14 (201), 15 (244a), 16 (244), 17 (132), 18 (226), 19 (129), 20 (235)

Pl. XXII PALAEOLITHIC IMPLEMENTS

Discoid cores & flakes from Gravel & Gravel Junction

1 (243), 2–3 (173), 4 (87), 5 (265), 6 (111), 7 (60), 8 (172)

Pl. XXIII PALAEOLITHIC IMPLEMENTS

a, b, c : Ovate, pear-shaped, triangular and keeled hand axes and cleavers from Alluvium

d : Hand axes and blade (excepting 20) from the loose gravel at Bahadarpur on the Orsang

1 (226a), 2 (71), 3 (69), 4 (75), 5 (263), 6 (224), 7–8 (261), 9 (198), 10 (74), 11 (50), 12 (178), 13 (180), 14 (171), 15 (82), 16 (286), 17 (296), 18 (295), 19 (309), 20 (122)

Pl. XXIV PALAEOLITHIC IMPLEMENTS

Pebble-tools : Choppers and a rostrocarinate type from different strata on the Sabarmati

1 (24), 2 (8), 3 (283), 4–5 (126), 6 (174), 7 (205), 8 (282), 9 (235), 10 (135), 11 (18), 12 (40), 13 (219), 14 (186), 15 (57), 16 (124a).

Pl. XXV SURFACE MICROLITHS : NATURAL SIZE

a, b, c : Various types of Cores. d : "Points".

1 (P272), 2 (685), 3 (482), 4 (477), 5 (697), 6 (697), 7 (793), 8 (797), 9 (819), 10 (15B), 11 (15D), 12 (119), 13 (232), 14 (456), 15 (286), 16 (725D), 17 (424), 18 (221), 19 (81).

Pl. XXVI SURFACE MICROLITHS : NATURAL SIZE

Various types of Flakes (blades, scrapers and "core trimmings")

1 (253), 2 (264C), 3 (220), 4 (325), 5 (135); 6 (330), 7 (802), 8 (68A), 9 (68B), 10 (264A), 11 (847), 12 (311), 13 (40), 14 (264), 15 (687), 16 (841), 17 (663), 18 (350), 19 (605), 20 (659), 21 (337).

Pl. XXVII SURFACE MICROLITHS : NATURAL SIZE

Various types of Flakes (Crescents)

1 (466), 2 (552), 3 (264D), 4 (246), 5 (319), 6 (565), 7 (169), 8 (831), 9 (58), 10 (495), 11 (367), 12 (402), 13 (190), 14 (456), 15 (842), 16 (164), 17 ( ), 18 (37), 19 (191A), 20 (45), 21 (247), 22 (352), 23 (449).

Pl. XXVIII SURFACE MICROLITHS : NATURAL SIZE

Various types of Flakes (2-edged blades)

1 (301), 2 (213), 3 (276), 4 (819), 5 ( ), 6 (821), 7 (258), 8 (926), 9 (204), 10 (24A), 11 (207), 12 (150), 13 (20), 14 (815), 15 (182).

Pl. XXIX (a) Excavated Microliths from Hirpura : Cores, Flakes and "Points." Nos. 1-15.
(b) Excavated bone tools from Hirpura and Langhnaj. Nos. 16-46

1 (227), 2 (279), 3 (306), 4 (337), 5 (59), 6 (321), 7 (295), 8 (338), 9 (308), 10 (343), 11 (411), 12 (31), 13 (315), 14 (40), 15 (327), 16 (820C3), 17 ( ), 18 ( ), 19 ( ), 20 ( ), 21 ( ), 21 ( ), 22 (917A), 23 ( ), 24 ( ), 25 (623), 26 (695), 27 (404), 28 ( ), 29 ( ), 30 ( ), 31 (415), 32 ( ), 33 ( ), 34 (895), 35 (90), 36 (786A), 37 ( ), 38 ( ), 39 ( ), 40 (667), 41 ( ), 42 (52), 43 ( ), 44 ( ), 45 (820G), 46 (667A1).

Pl. XXX EXCAVATED MICROLITHS FROM LANGHNAJ : NATURAL SIZE

"Points", broad, 2-edged and crescent flakes

1 (178), 2 (814), 3 (685), 4 (683), 5 (74), 6 (229), 7 (417), 8 (876), 9 (295), 10 (641), 11 (377), 12 (496), 13 (460), 14 (483), 15 (508), 16 (394), 17 (?), 18 (22), 19 (934), 20 (241), 21 (382), 22 (480), 23 (484), 24 (32), 25 (379).

Pl. XXXI EXCAVATED MICROLITHS FROM LANGHNAJ : NATURAL SIZE

Flakes, Cores and "Core trimmings"

1 (89), 2 (928), 3 (732), 4 (26), 5 (808), 6 (203), 7 (474), 8 (655), 9 (814), 10 (503), 11 (654), 12 (276), 13 (737), 14 (132), 15 (741), 16 (228), 17 (227), 18 (710), 19 (21), 20 (355), 21 (364), 22 (505), 23 (112), 24 (130), 25 (720).

TEXT FIGURES

I Transverse section across both banks of the Sabarmati between Kot and Sadolia (after Foote, *The Geology of Baroda State*, pl. iv). Facing p. 14

II Longitudinal section along the right bank of the Sabarmati near Hirpura Facing p. 15

III Transverse section across the right bank of the Sabarmati from the spot in the fig. to Goghadwa Nala Facing p. 17

IV Longit :tinal section along the right bank of the Sabarmati at Pedhamli Facing p. 20

V Longitudinal section along the right bank of the Sabarmati at New Hadol Nala, Hadol. Facing p. 40

VI Longitudinal section along the ight bank of the Sabarmati at Old Hadol Nala, Hadol. Facing p. 41

V Section of the right bank of the Orsang at Kundya Nala, Bahadarpur Facing p. 44

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MAPS

Map Frontispiece — Map of Northern and Central Gujarat showing prehistoric sites

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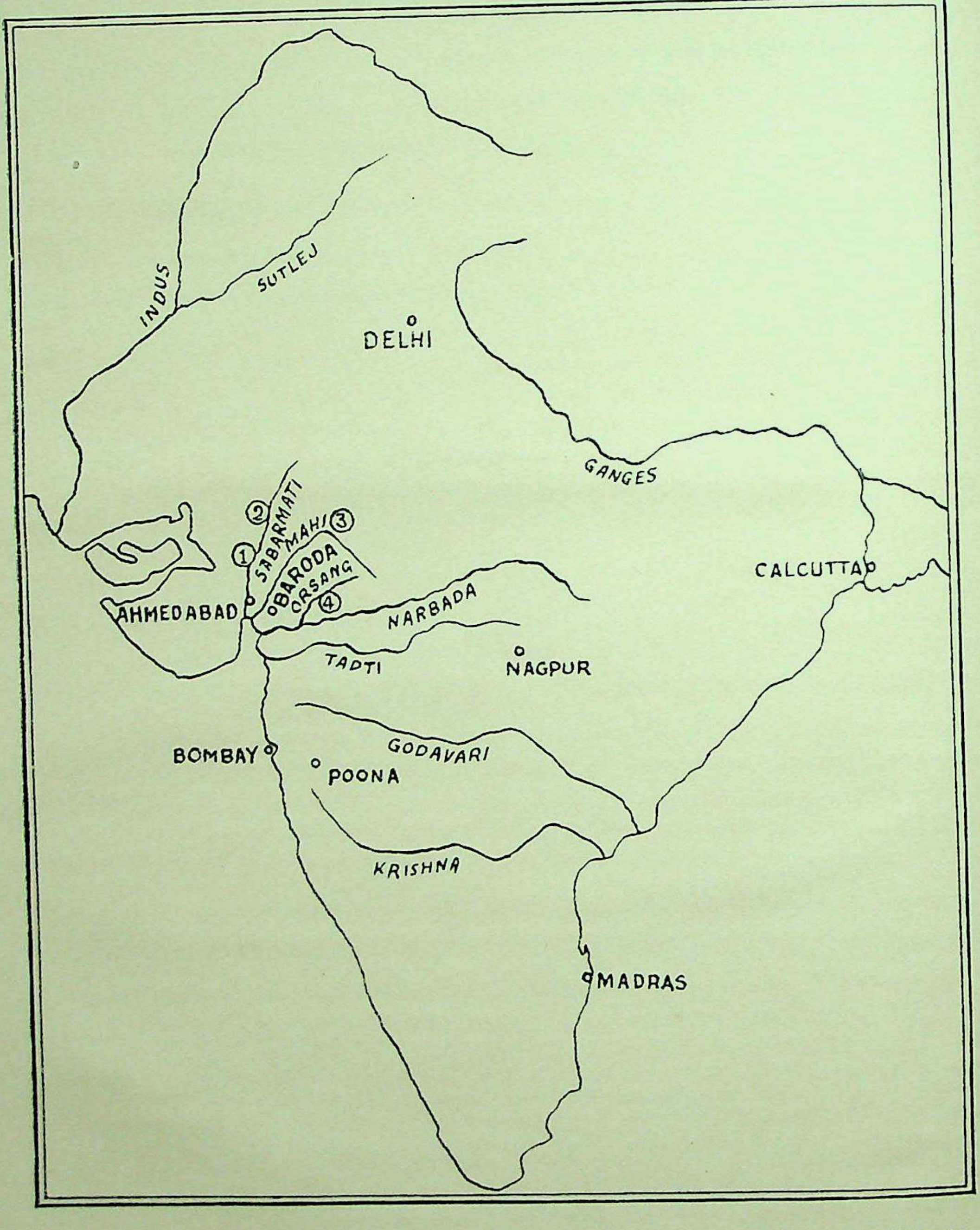
Map No. III — From the Virpur-Reach to the Mahuri-Reach

Map No. IV — From the Mahudi (Mahuri)-Reach to the Sadra Reach

Map No. V — Map showing the distribution of Loess hills in Northern and Central Gujarat and the microlithic sites so far discovered in relation to them.

LIST OF ABBREVIATIONS

AR.AD.ND.	*Annual Report of the Archaeological Department Nizam's Dominions*
GBS	*Geology of the Baroda State* by Robert Bruce FOOTE
MASI	*Memoir of the Archaeological Survey of India*
MGSI	*Memoir of the Geological Survey of India*
OIP	*Oriental Institute Publication Chicago*
RGSI	*Records of the Geological Survey of India*



Index map showing the location of the four areas with which this report is concerned. (1) and (2) in the Sabarmati Valley, (3) in the Mahi, (4) in the Orsang.

CHAPTER I

PART I

GEOGRAPHIC AND GEOLOGIC ASPECTS OF THE REGION

Situation of Gujarat

Gujarat forms the north-west corner of western India and the northern part of the Bombay Presidency. It is divisible into two parts: Gujarat proper and Kathiawar. The former is on the whole a lowland region, but it has a coastal plain on the west and numerous small hills in the hinterland further east. It is bounded on the north by Mt. Abu and the Aravalli range beyond which is the Marwar desert; by the Great Rann of Cutch on the north-west; towards the south-west the silt of the rivers-Banas and others-has filled the sea-bed and joined it with the main land of Kathiawar; on the west is the gulf of Cambay and the north-eastern area of the Kathiawar peninsula; and further down, the Arabian sea. On the south Gujarat is bounded by the Deccan plateau which very nearly abuts on the coastal plain between Daman and Dahanu. On the east are the gorges of the Narmadā and the Tāpī, with Sātpura hills in between; on the north-east lie the Mewar and Malwa plateaux.

Divisions of the Area surveyed

Of this vast territory the Report is concerned only with a small area surveyed by the Expedition. Even this is divisible into 4 sub-areas:

(1) The area within the Vijāpur, Kalol, Kadi and Mehsana Mahals[1] of the Baroda State.
(2) The small principality of Hadol, Gadhwāda, till recently (and when we visited the area) under the Sabara Kantha State Agency.[2]
(3) A small stretch of land, along the Mahi river from Vasad to Jalampura, partly in the Baroda and partly in the British territory.
(4) A small area along the Orsang river in the Sankheda Mahal of the Baroda State.

The first two sub-areas fall within what is known as 'Northern Gujarat'; the other within 'Central Gujarat'.

Physiography
i. Vijapur Mahal

The greater part of these areas forms part of the alluvial coastal strip "which has been formed by the encroachment of the shallow gulf of Cambay,

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1 For fiscal purposes the Baroda State has grouped the various tracts composing the State into four Prants (or Districts). Each Prant is further subdivided into Mahals (or Talukas).

2 The difficulty in describing these areas arises from the fact that "the Gujarat divisions of Baroda are separated from each other by intercalated parts of British territory and the Political Agencies", so much so that in certain parts one bank and half of the river belongs to the Baroda State and the other to a British District.

of the detrital deposits brought down by the many rivers, which drain the province of Gujarat, the western slopes of Malwa, and the southern parts of Rajputana. The upward slope of the alluvial strip, from the seaboard eastward, is very gradual, so that, except where wind-blown accumulations of loam, or sand, make small local eminences here and there, the face of the country appears to be a dead flat. It is only as the eastern side of the alluvial flat is approached that it is interrupted by low hills, which rise up at intervals, or bounded by yet lower downs dividing the small river courses".[3] Thus the Vijapur Mahal extending from Makakhad in the south to Virpur in the north is simply a flat alluvial plain, unrelieved by any hill. Stretches and stretches of loess cover miles on end these huge river deposits, which at places look like hillocks with a height varying from 20 to 100 feet, whereas where the river or its tributaries have cut through these alluvial and eolian deposits deep canyon-like gullies or *nallas* (*nalas*), also called (*kotars*), have been formed.[3a]

ii. Hadol

This regularity of features changes as we go north-eastwards towards Hadol. The ground rises up gradually, becoming rocky. This is natural, "as it is the very fringe, or the outer periphery of the country in which the Aravalli range falls to the south-west into the plains of Gujarat, breaking up into finger-like ridges, extending out into the alluvium and finally ending as scattered outcrops of rocks rising like islands from the waves of sand."[4] Physiographically the area falls into four sub-divisions. The north-eastern part is hilly, marked by low longitudinal ridges running from north-east to south-west direction; the central, or the northern, consisting of Hadol proper and the Taranga Hill is the most hilly, composed chiefly of granite; the western is more open, formed by alluvial plains, diversified by scattered ridges and isolated groups of rocky hills; the southern and south-western is predominently alluvial, capped by loess deposits. "The soil is light loam, becoming, away from the hills towards the south-west, low hummocks of sand blown in by the south-west wind". The Sābarmati passes through the east of the area.

Hadol forms part of the Satlasna political division, which along with Sudasna, Bhalusan, and Umbri constitute what is known as Gadhwara (Gadhwāḍa).[5] This along with Idar and Sudasna are under the Sabar Kantha State Agency or the States of Western India Agency. These small principalities are on the northernmost border of the Bombay Presidency.

iii. Area on the Mahi

The small area along the Mahī from Vāsad to Jālampura does not differ much from the alluvial and loess plains of Vijapur Mahal. Perhaps the proportion of loess is less here and the soil begins to be blackish.

3 Bruce FOOTE, *Geology of Baroda State*, (1894) p. 2-3; *Ibid.* edited by C. C. SHAH (1938) p. 1-2.

3a It is the presence of these *kotars* or gullies which accounts for the name Sābarmatī (Skt. S'vabhramatī=full of holes).

4 *Records Geological Survey of India*, (*RGSI*), Vol. 72 (1936), p. 368.

5 According to the recent changes, this is now under Baroda.

iv. Sankheda Mahal

The physiography of the Sankheda Mahal varies to some extent. This mahal has the widest alluvial band formed by the Orsang, the Unch, and the Heran rivers, running up eastward beyond the eastern boundary of the State. "Through the alluvial flat rise the most conspicuous inliers of the older rocks, like hilly islands." These are:

> The Gugalpur hill of quartzite, 371 feet above sea-level, and 2 miles long; the Achali ridge, 888 feet above sea-level; the Vidwaswami Mata hill, "the first of the island-like inliers of the older rocks", having a maximum height of 338 feet and 2½ miles east of Sankheda. Then the Ghora; Songir sandstone; Kanakua light coloured quartz hill; the Sandia braeccia hills (?); the Nathpur sandstone ridge, and lastly the Lachharas quartzite hill.

While these are real hills, a few hillocks of loess rising from 25 to 50 feet are scattered near Mankni between the Orsang and the Unch. "These have a linear arrangement, their axis having a strike of 15° north of east, which is the prevailing course of the wind." But the surface soil of these plains in this area is not always of purely æolian nature. Here silt and fine sand are mixed with a blackish matter–"a weathering product of warm temperate and subtropical regions developed on argillaceous rocks." This latter formation, it is believed, "required heavier vegetation than is found nowadays, because of its high content of colloids derived from trap and other felspar bearing rocks."[6] Whatever might be the reason, the soil here is ideally suited for cotton crop; but to the east and north-east of Sankheda, there is undulating ground having a reddish sandy loam soil.[7]

Climate

The climate of these different divisions of Gujarat varies. The northern division is drier and colder with less rain (about 30 inches) than in the Central, which receives about 40 inches at an average; hence the climate is moist though not so much as that of the Konkan or the western coast of Bombay.

The vegetation varies according to climate and soil. Babul (*Acacia arabica*) trees, cactus thickets and bor (*Zizyphus jujuba*) are common in the northern area, though mango groves, nim, tamarind, and pipal trees are not uncommon wherever there is habitation.[8] Rich crops grow where the land is tilled and water available. In the central area besides the trees already mentioned,[9] Palāśa (*Butea frondosa*) with its reddish yellow flowers (Kesuḍā) is the most prominent feature of the landscape as we go into the interior towards the hilly tracts of Chhota Udepur. Around Sankheda cotton is grown extensively.

6 Cf. De TERRA and PATERSON, *Ice Age and Human Cultures in India*, p. 319–20.

7 *Bombay Gazetteer* (Baroda), Vol. VII, p. 13.

8 A number of fruit trees are grown. cf. *Bombay Gazetteer*, Vol. IV (Ahmedabad), p. 24

9 Here the vegetation varies according to the black or light red sandy soil. Fruit trees are grown. cf. *Bombay Gazetteer*, Vol. VII (Baroda), p. 13 and 40.

PART II

BRIEF OUTLINE OF GEOLOGIC STRUCTURE

Previous work

Bruce FOOTE was specially engaged to report on the geology of the Baroda State. Since the publication of his work in 1898 no work was done on the general geology. All subsequent work was confined mainly to the investigation of mineral resources of the State.[10] In fact this was the main task for which FOOTE was appointed.[11] He was, however, a man of much larger interests, and as a pioneer he dived deep into the subject. As a result he has left behind a work, which by its intrinsic merit and in absence of any subsequent work, is the standard work on the geology of this area. What follows is based primarily on FOOTE's study. It is brought (wherever possible) up to date by whatever we could observe in our archaeological studies and by reference to the work done by members of the Geological Survey in and around Gujarat. It is indeed a pity that the Survey has not been able to take up the problem of the loess deposits referred to by FOOTE 50 years ago[12] '.

(A) SABARMATI BASIN

The geological evolution of Northern Gujarat is well illustrated by the Sabarmati basin. Particularly where the basin is clearly exposed by the river and weather action, the various geological formations or the rock series are laid bare, allowing us to study the structure and compare it with that of the rest of India. Such exposures are not uniformly similar in their thickness or contents; nevertheless they are welcome, as they afford a glimpse of the country for the most part hidden under a thick mantle of æolian and river deposits.

Drainage system of Northern Gujarat

To understand what follows, a brief idea of the drainage system of Gujarat, and acquaintance with the Sabarmati Valley is necessary.

Though small and large rivers all flowing south and west, drain the country, they do not all fall directly into the Arabian sea. The Banas and Sarasvati, draining the northernmost part of Gujarat fall into the Rann of Cutch; the Sabarmati, Watrak and other smaller northern rivers as well as the Mahi, Narbada, and Tāpti draining Central and Southern Gujarat fall into the Gulf of Cambay.

The Sabarmati

The Sabarmati is the principal river of Northern Gujarat. It rises under the name of Sābar, in the south-western spurs of the Aravalli hills, near the temple of Amba Bhavani in the Danta State. Taking a southerly course, it first runs through this State, then the

10 FOOTE, *Geology of the Baroda State*, (2nd Edition, edited by C. C. SHAH), Editor's Note.

11 *Ibid.* First Edition, Preface.

12 *Ibid*, p. 100; and *Indian Prehistoric and Protohistoric Antiquities and Notes on Distribution* etc., p. 135; see however in this Report, Appendix III and IV, Analysis of Soil Samples.

Sabarkantha Agency, and skirting the Idar State, where it meets one of its large tributaries, the Hathmati, touches the Baroda State at Virpur (or Unadra ?) in Kheralu Mahal. After running along its border for 36 miles it enters the State at Aglod and flows through it for 18½ miles. Emerging at Warsora[13] in the British territory it flows by the Dehgam Mahal of the State. A little south of Ahmadabad it is joined by the Khari, the Meswa and the Watrak. This conjoint stream broadening out into the vast alluvial flats falls into the Gulf of Cambay.

Geological evolution

The Sabarmati sections or exposures reveal that Gujarat has gone through, if not all, perhaps all the more important stages of evolution witnessed elsewhere in India. These may be divided into three stages:

1 The pre-Sabarmati stage.

2 The Sabarmati stage.

3 The post-Sabarmati stage.

The pre-Sabarmati stage is represented by the geological formations falling into the Archean, Champaner or Dharwar, Marine Cretaceous or Cretaceous, and possibly the Laterite of the Eocene period. For the Deccan trap and the subsequent Nummulitic formations there is no positive evidence. These are extensively developed in the southern parts of Gujarat in the valleys of the Narbadā and the Tapti and are also seen on the outskirts of Northern Gujarat in the Watrak in the east and Kathiawar in the west.

The second stage of development is here called "the Sabarmati," which changed the face of the country. Not only over the Eocene but over the still older rocks of the Palaeozoic period a river began to flow. Traces of its existence then are seen in the old alluvium, gravel and silt deposited by it on these rocks. Geologically such deposits are considered to be recent phenomena.

But a still more recent phenomenon (here termed the post-Sabarmati stage) is seen in the huge deposits of wind-blown loam and sand which overlie the old alluvial deposits.

Pre-Sabarmati Stage. Earliest formations

Granite exposed within the Baroda State at Virpur appears to be the oldest formation in this area. "It occurs in the bed and bank of the Sabarmati, where the river course is cut by lat. 23°-45''[14]. This granite area "is the southernmost point of an outlier of the granite region lying east and south-east of Palanpur. "It is 2¼ miles long, from north to south; at the southern end the granite shows only where the river is low, but as it is followed up northwards, it rises higher and higher in the banks, the overlying grits thinning out progres-

13 Warsora is governed by a Thakor, who was till recently under the British Resident. He is now under Baroda.

14 FOOTE, *op. cit.*, p. 22-23; SHAH, *op. cit.*, p. 15.

sively, and forms to the E. by N. a small hill on the right side of the river......" As we had not gone so far as Virpur, this area did not come within our survey. But we noticed about 10 feet of granite exposed at the northern end of Hadol, near Juna Nala, on the right bank of the river. Here it is directly overlaid by the gravel conglomerate,[15] whereas at Virpur it is overlaid by "rough grey gritty sandstone"[16]. At Hadol, however, the granite does not crop up in the bed of the river, nor is it seen forming part of the river-bank, at about a mile further down, near Navi Hadol. A layer of disintegrated granite seems to take its place.[17]

Submetamorphic

The Champaner, or Submetamorphic rocks (now included in the Dharwar system in Indian geology) including quartzites, schists, slates and limestones, supposed to be Azoic, are not found in the Sabarmati basin within the Baroda State or the Hadol principality,[18] but these-particularly quartzite is developed in adjacent areas to the north-east and east in the Sirohi,[19] Udaipur,[20] and Idar States.[21] The rock is not of the same kind everywhere. It varies in texture and colour from region to region[22] and is called accordingly the Alwar or the Aravalli quartzite.[23] Both the varieties, however, form part of the so-called "Delhi System"[24] which chronologically is supposed to follow the "Aravalli System" composed of mica schists, and composite gneisses. According to this view the Hadol granite formation, which is really an expansion of the so-called Erinpura granite formation is considered an Intrusive rock.[25] Whatever might have been the actual position of quartzite in the geological formation it is pebbles of this rock which formed Early Man's raw material for tools. Some of these correspond to the harsh and rough textured, coarse grained, almost pinkish brown and greyish white Alwar quartzite; others to the smoother, porcellanic, greenish grey, weathering pale brown, or rather dark grey or white Aravalli variety.[26]

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15 See Pl. III (a) and Fig. 6.
16 FOOTE, *op. cit.*, p. 66; SHAH, *op. cit.*, p. 47.
17 See Fig. 5.
18 *RGSI.*, 73 (1939), p. 369.
19 *MGSI.*, 63 (1933), p. 23-4; *RGSI.*, 72 (1938), p. 374; (N. L. SHARMA, 1931, p. 21).
20 *RGSI.*, 72, pl. 30.
21 *MGSI.*, 44 (1923), p. 3.
22 *RGSI.*, 72, p. 376.
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Cretaceous or Eocene?

The next succeeding rock series is the Marine Cretaceous, locally called the Bagh Series. According to FOOTE this series is represented only in the Songir sandstone in Sankheda Mahal, but according to the subsequent work of MIDDLEMISS, the sandstone formations which are exposed in the Hathmati, Idar State, and at Virpur, Phudera and Pedhamli on the Sabarmati, Baroda State are not only identical formations, but belong to the Marine Cretaceous (e. g. Jurassic Cretaceous) [28] because

(i) these beds in the Idar State lie with a pronounced unconformity
 (a) either on Idar granite as at Gharvada, Berna, Wantra;
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(ii) the whole series, especially the valuable freestone runs, seem very faithfully to reproduce those of the Dhrangadra freestone of north-east Kathiawar, the Songir stone of Baroda, and possibly also the Barmer sandstone of western Rajputana.

Hence he concluded that the laterite layers associated with sandstone series of the river were merely surface phenomena, not seen in any good massive quarry section, and the sandstone stratum was not Eocene as FOOTE[30] and Samba Siva IYER[31] considered but Cretaceous.

This sandstone series which has yielded no fossil remains is lithologically supposed to be coeval with such rocks of Cutch and Kathiawar, of generally marine facies, and not with the uppermost Gondwana or Vindhyan series. It however has variegated colours, white with pinkish shades and streaks with occasional ferruginous concretions. The lower portion near the base is conglomeratic and of a purplish tint. It is sometimes coloured brick red, chocolate brown and rarely dark brown and fine grained.

With the sandstone beds are many shaly layers and others of mottled pink and white calcareous clay or lithomerge. Layers of kaolin are found locally, especially in the Sabarmati section at Eklara at the base of the section where it rests on the Idar granite.

These granite and kaolin formations are not visible in the Sabarmati sections at Pedhamli or Phudera or Rampur; here the lowest bed is the shaly-sandstone layer showing all the varied colours mentioned above.

27 *Ibid.*, p. 403.
28 *MGSI.*, XLIV (1923), p. 142.
29 *Ibid.*, p. 138.
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Laterite

Laterite, supposed to be of the Eocene period, overlies the sandstone and shale series. The lateritic beds are not continous. We saw no trace of them at Hadol, but FOOTE[32] noticed them at Virpur, just where the Sabarmati first touches the Baroda State, associated with grits and sandstones, and overlaid by the old alluvium of the river. Here they are not much exposed, but further south near Jawanpura, on the left bank of the river, they rise to form a cliff 20 to 30 feet high. Next these beds appear at Phudera and Pedhamli, but now as thin partings, and then finally below Pedhamli in what FOOTE calls "the upper and lower gorge."

Besides in the Sabarmati, the lateritic rocks were observed by FOOTE in one more river of Northern Gujarat, viz. the Watrak. This was just east of the village of Paori Moti 6 miles north-east by north of Atarsumba and 13 miles east by south of Dehgam. The lateritic layer here is not only thick, but richly haematitic.

These laterite beds are absolutely unfossiliferous. But FOOTE tentatively classed them as of Nummulitic age forming part of the Eocene, or the latest phase of the Tertiary, on the ground that precisely similar rocks were found by him in the valleys of the Kim and Tāpti in Southern Gujarat, which were closely associated with rocks abounding in Nummulites and other Eocene fossils.

It is rather a pity that these lateritic beds cannot be assigned to a more definite geological position. For while FOOTE considered them as well as the underlying sandstones as Eocene, MIDDLEMISS considers the latter as of Marine and at least of the Cretaceous period, and the laterite, which does not occur in continuous thick beds, as a surface phenomenon. If this view is accepted then it would mean that in Northern Gujarat, in the area drained by the Sabarmati the Tertiary formations–Laterite or the Deccan trap–are missing, "though they are plainly developed a little further south in the Meshva and Majham drainage areas." MIDDLEMISS, therefore, thought, "Probably both these formations, that are so characteristic of the neighbouring area to the east and south-east have just found their limits of extension on the border of Idar State, although they are well represented further west and south-west in Cutch and Kathiawar."

Proper knowledge of Laterite formations necessary

If we cannot understand properly the exact geological position of the laterite beds we cannot correlate them with similar beds in South India and Mayurbhanj which have yielded palaeolithic industries, nor can we say much about the climatic conditions of Northern Gujarat, save this that prior to the deposition of the river alluvium a fairly heavy rainfall, heavier than at present, must have visited the area.

The Sabarmati stage

Whatever be the exact origin and position of laterite rocks in the Sabarmati basin, with them ends the prequaternary period. For the next stratum is the old river alluvium. Where all the rock series mentioned above exist and the section is clearly exposed, it is seen to overlie the lateritic bed, which rests on or is associated with sandstone or

32 *GBS.*, p. 65. SHAH, p. 46.

shale; the latter superimposed on the basal bed of granite. FOOTE noticed such a complete section at Virpur. At Pedhamli further down, the basal bed is that of sandstone, and the old river alluvium overlies laterite; whereas at Hadol in the north, the old alluvium directly rests on the granite bed.

Composition of the gravel

The gravelly portion of the alluvium is chiefly composed of quartz and quartzite pebbles derived from the granite and Champaner rocks, (quartzites, limestones, calcareous schists, clay schists, etc.), occurring to the north-east and east. At some places, usually in the higher reaches of the river, it is distinctly pebbly; while in the lower reaches it is composed of fine gravel. Usually it is cemented together by the infiltration of carbonate of lime into a hard conglomerate, and where freshly exposed appears whitish grey; where the gravel has weathered, as in the Ghadhara Nala (Ghadhaḍa or Gadhaḍa), dark grey or blackish, but at some places, "the gravels near the base of the alluvium in the upper reaches show a bright rusty red colour and at a distance look much like poorly ferruginous laterites." Such reddish, extremely hardened gravels, occur below Mahuri (Mahuḍi).

The silty part of the alluvium is brownish in colour and has a great thickness, sometimes as much as 30 feet.

Origin of the Loess

Over the river alluvium lie huge deposits of wind-blown silt and sand, called loam or more properly loess (from the German löss). This covers the whole face of the country in Northern and most of Central Gujarat. There is no doubt that this is a wind-blown deposit. For we notice these deposits heaped up on sheer granite rocks at a height of 1500 feet in the Taranga hills,[33] and elsewhere in the Danta,[34] Sirohi,[35] and Idar States.[36] It is however a problem whence these deposits came. FOOTE was of the opinion[37] that since the numerous loess hills or dunes which are found in clusters all over Northern Gujarat and sometimes scattered in isolated places had "the direction of their longer axis most frequently north of east, a direction approximately parallel with, instead of, at right angles to, the direction of the prevailing winds, they were "caused by the carrying action of the wind bringing fresh material from the south-westward, from the beaches and great sand banks of the Gulf of Cambay, and the estuaries of the great rivers opening into it," besides "the wind action tearing up the bare parts of the loess plain generally". He was however not quite sure of this hypothesis,[38] because he had not the full knowledge of the prevailing winds, nor had he examined the Gulf of Cambay and the lower parts of the Sabarmati and Mahi valleys.

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33 See Pl. IV (d).

34 *RGSI.*, 72, p. 403.

35 *MGSI.*, 63, Pt. i (1933), p. 148.

36 *MGSI.*, 44 (1923), p. 144.

37 *GBS.*, p. 3-4, p. 100-1 and SHAH, p. 2 and 70-71.

38 *Ibid.*, p. 100 (This reservation has been omitted by SHAH).

FOOTE's view is borne out to some extent by the mineral composition[39] of the soil samples collected by the Expedition from Taranga Hill and Hadol in the extreme north of Gujarat, from the excavations of the loess mounds at Hirpura and Langhnaj and from Bahadarpur in Central Gujarat. According to this examination the accumulation of such huge deposits seems to be due to the transportation by the scuthwest drainage system of Northern Gujarat the eroded material from the rocks in the north and north-east and the recarraigc back and redeposition by the westerly winds.[40] Thus purely local conditions such as the seasonal monsoon floods and summer dust-storms seem in our present knowledge to be the cause of the loessic deposits in Gujarat. Their origin cannot be attributed to certain climatic conditions, such as the advance or withdrawal of the Ice ages, conditions similar to those which caused the loess formation in the Punjab,[41] and Kashmir basin and the Rhine and the Danube, unless these features themselves are assignable to the Ice Ages in the north.[42]

Three features of of Gujarat Loess

Whatever be the causes of the loess formation in Gujarat, there are three remarkable features about it. The first, viz. the existence of a number of loess hills,[43] usually in the S.W. - N.E. direction has already been referred to above. The second feature is "the formation[44] of small inundation lakes, lying in hollows formed by loess hills and having no outflow. They are of small size, rarely more than a few hundred feet across and apparently quite shallow. The water contained in them is when quiescent quite limpid, and they are features of beauty in the landscape." We saw two such lakes; one at Akhaj, the other at Langhnaj. Numerous cranes were found on the banks of the former lake. The third feature according to FOOTE was the absence of fossil remains in the loess, whereas remains of fossilized land shells is a prominent feature of the European loess formations. This is generally true; but we did find in the excavation at Langhnaj, a few fossilized remains of animals,[45] the skeleton of a small lizard-like animal and land and fresh water shells.

It is these loess hills which abound in microliths and sometimes potsherds, which together FOOTE ascribed to the Neolithic period.

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39 See Appendix IV.

40 Cf. the view of present geologists, when it is said "It is not river alluvium, being far above the level of any river, and it is too fine grained to be rain wash from the granite hills which surrounded it...It is heaped up to the wind-ward (i. e. south-west) side of bold hills near Umbri, Bhalusana and Satlasna..." *RGSI.*, 72., p. 403; *MGSI.*, 44 (1923), p. 44.

41 For details see Appendix VI.

42 For details see Appendix VI.

43 For a full list see FOOTE, *GBS.*, p. 99; SHAH, *ibid.*, p. 70-71, and here Map V.

44 *Ibid.*, p. 101; SHAH, *ibid.*, p. 71-72.

45 See Appendix IV.

(B) The Orsang Basin

The geology of the Orsang and basins of other rivers which make up Central Gujarat is indeed complex in the sense that the river banks, being less in height, do not expose the same or as many series of rock formations as do the Sabarmati banks, making a stratigraphical study difficult. However, these formations are found elsewhere in the area.

The Orsang rises in the high lands of Central India, and is one of the main tributaries of the Narbadā. Its lower course lies through the Baroda territory between Bodeli in the north and Chandod in the south beyond which it joins the Narbadā. It has two sub-tributaries, the Unch and the Heran.

The oldest rocks–granite, gneiss, etc., are seen as outcrops at different places in the bed and bank of the Orsang. "By far the greater part of the rock exposed in the bed and banks of the Orsang is grey or pinkish granite. At some places, particularly near Bhulwan and at Wadeli it has gneissic structure; near about Motipura, limestone and marble beds are seen; while at some places intrusions of quartz may be seen penetrating the granite in the Orsang." Unfortunately these varieties of archean rocks are noticed as outcrops coming up from the thick alluvial mantle, so a proper stratigraphic study is not possible.

The same is true of the succeeding rock series. The submetamorphic rocks such as quartzites are nowhere seen forming part of the river bank, but a number of quartzite ridges are visible north of the Orsang river.[46]

The Marine Cretaceous series are represented by the sandstone rock at Songir in the Heran valley.[47] This is supposed to be coeval or identical with the Bagh, or Ahmednagar sandstone series.

The Deccan trap series, preceding the deposition of the old river alluvia, is almost denuded from Central Gujarat as in Northern. No remains of it are found in the Orsang valley, but Foote mentions a few patches of these rocks, one of them in the Heran valley, at Wasna "resting on the course river shingle."[48] "No lateritic rocks of any sort occur in the Baroda Prant, but they and their associates, which are here unmistakably of nummulitic age occur largely in the Narbada and the Tapti valleys."[49]

Finally we come to the alluvial and subaerial formations.[50] These, if not so thick as in Northern Gujarat, are sufficiently thick, so that the banks of the Orsang and its tributaries are also cut up into *kotars* or gullies. The topmost layer of the surface deposits is, however, different in Central and particularly in Southern Gujarat. In the former the loess formation underlies a

46 Shah, *ibid.*, p. 20.
47 Foote, *ibid.*, p. 43; Shah, *ibid.*, p. 30.
48 *Ibid.*, p. 55; Shah, *ibid.*, p. 39.
49 *Ibid.*, p. 70; Shah, *ibid.*, p. 49–50.

small, but superficial deposit of black regur or cotton soil; in the latter this soil directly overlies the river alluvium.[50]

Geologic and climatic factors now active in Gujarat

It has not been ascertained to what extent geologic and climatic factors are now active in keeping the face of the country as it is or changing it. FOOTE writes that the present Gujarat rivers are far more destructive than constructive, at least in their upper and middle courses, for the extent of the deposition they now form or they have accumulated is extremely small when compared with the vast quantity of material they carried down when in flood. The deposits they form are mostly fine loamy clays with sandy partings forming together very fertile patches of alluvium.[51]

The wind deposits are no doubt eroded a great deal by the monsoon rains. But it is believed that the summer winds more than make up for this loss by blowing vast quantities of sand and dust, which are steadily found even more eastward.[52] Popular opinion, however, is that the rainfall has gradually decreased in Northern Gujarat, and that the land is becoming more and more arid, by the spread of salt efflorescence from the Runn in the north and the sea in the west.[53] But this view is proved fallacious by a climatologist who believes that no large scale climatic change has occurred in the last hundred years or more.[54]

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50 *Ibid.*, p. 94 and 84; SHAH, *ibid.*, p. 57 and 60.

51 FOOTE, *GBS.*, p. 91; SHAH, *ibid.*, p. 64–65.

52 *MGSI.*, 63 (1933), p. 23-4.

53 *Journal of the Gujarat Research Society*, Vol. III (1941), pp. 229–35.

54 *Ibid.*, pp. 236–48.

CHAPTER II

THE RIVER VALLEY SURVEY

PART I

THE SABARMATI PALAEOLITHIC INDUSTRY

There are two ways in which the survey of a river valley in search of palaeolithic finds can be presented. The first way is to mention the sites in the order in which they were visited. The second way is to discuss the sites in the order of their importance. The latter would certainly be the more scientific method of approaching the subject, but it implies some amount of anticipation of the results, while the former gives an unbiased view of the picture. Since the Sabarmati palaeolithic industry is discussed subsequently both stratigraphically and stylistically, it would be advisable to follow the first method, *viz.* the "regional" or the "serial".

KOT–SADOLIA

As said in the Introduction our scheme of work was to follow the clues left by FOOTE, though here too it was so arranged that we could follow the river upstream. Accordingly Sadolia came first, the site where FOOTE had found in 1893 a flake and a "Madras type" hand axe.[1] It should be really called the site of Koṭ[2] –(Anoḍia) [3], for it is situated on the right bank of the Sabarmati, below this village in the Baroda State, whereas Sadolia of FOOTE is on the opposite bank in the Prantij taluka, of the Ahmadabad district. He had called it by this name probably because the site where he actually found the specimens lies exactly opposite the Sadolia village.

The site is approached from Kot through any one of the gullies (*kotars*) that lead down to the right bank. From the foot of the gully known as Kot, FOOTE's site is approximately half a mile, and lies directly opposite the left bank on which stands a small temple. Between the two banks the distance is about a quarter mile. With the exception of two channels–one small and shallow almost mid-stream, and the other large and fairly deep near the left bank,–the entire bed was sandy.

The banks may be of almost the same height, but the left bank gives a better view of its composition than the right. The latter throughout its length from the Kot gully up to the point opposite Sadolia was hidden from view by maize fields and thickets of *babul* and other thorny shrubs. These latter make movement very difficult, particularly where a steep side of the bank is to be examined.

In our first visit to the site our search was mainly confined to the spot indicated by FOOTE. After over an hour's search we succeeded in collecting

1 FOOTE, *Indian Prehistoric and Protohistoric Antiquities, Notes on Ages,* p. 15 and p. 142; *Catalogue Raisonne*, p. 207; *GBS.*, p. 86-7.
2 Survey Sheet 1″=1 Mile. No. 46-A/II × 15.
3 Locally the place is known by this joint name.

two small flakes *in situ* in the gravel. Subsequent search proved fruitless. We then crossed over to the opposite bank at Sadolia. No finds were made here, but well exposed sides of the bank gave a clear idea of the stratification. Below the loess deposit, there was approximately 25 feet of red loam (silt) and *kankar*. Underlying this was the conglomerate bed about 15 feet thick. Laterite pellets in the gravel showed that the conglomerate was lateritized. Beneath the gravel bed was a 15 $\pm$ feet bed of bluish clay presumably containing much organic matter.

The order of stratification differs slightly from that noted and illustrated by FOOTE[4]. According to him the shingle bed, what we call 'gravel conglomerate', is divisible into three layers, viz. beginning from above, 'shingle', then 'Implement shingle', then underlying it a bed of 'calcareous conglomerate', and finally 'shingle, sandy, locally ferruginous'.

It will be noticed that FOOTE does not mention the bed of bluish clay. This may be because he did not find it on the Kot side, whence he had collected the two finds mentioned above, whereas the section is clearly exposed only on the left bank.

In spite of this difference, the stratigraphical position of our finds does not materially change. They were found in what FOOTE calls "Implement Shingle" forming part of the entire gravel bed. The reason why he prefers to call it shingle bed is that at places it is imperfectly consolidated.

FINDS FROM KOT, OPPOSITE SADOLIA

No. 1 Rectangular, slightly rolled flake of jaspery quartzite; plano-convex; underside primary flaked surface with a bulb of percussion, and striking platform; upper surface slightly but steeply flaked on sides, the longer side having a sinuous edge.[5]

No. 2 Small sub-triangular flake of chert, glossy owing to abrasion (?); underside primary flaked surface with a prominent bulb of percussion and obtuse-angled striking platform on the butt-end; upper surface is flaked on one side and has one end spatulate, the other angular.[6]

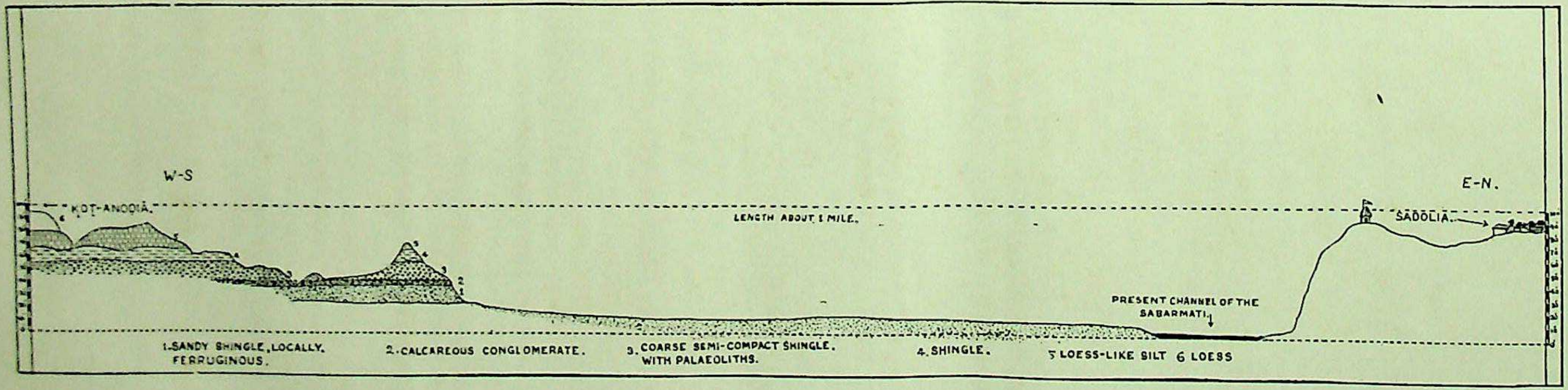
No. 3 Triangular flake of whitish quartzite; flaked uneven undersurface, steep roughly flaked sides, with a few clear "step" scars, leaving a smooth flat small patch of cortex in the centre, the pointed end has its base chipped.[7]

Two of these three flakes exhibit early Levallois-type of technique, while the third exhibits employment of crude "step" flaking.

Both these techniques, but rather of an advanced type, are seen in FOOTE's specimens.[8] His flake, No. 3246-1 is not hitherto described fully. It

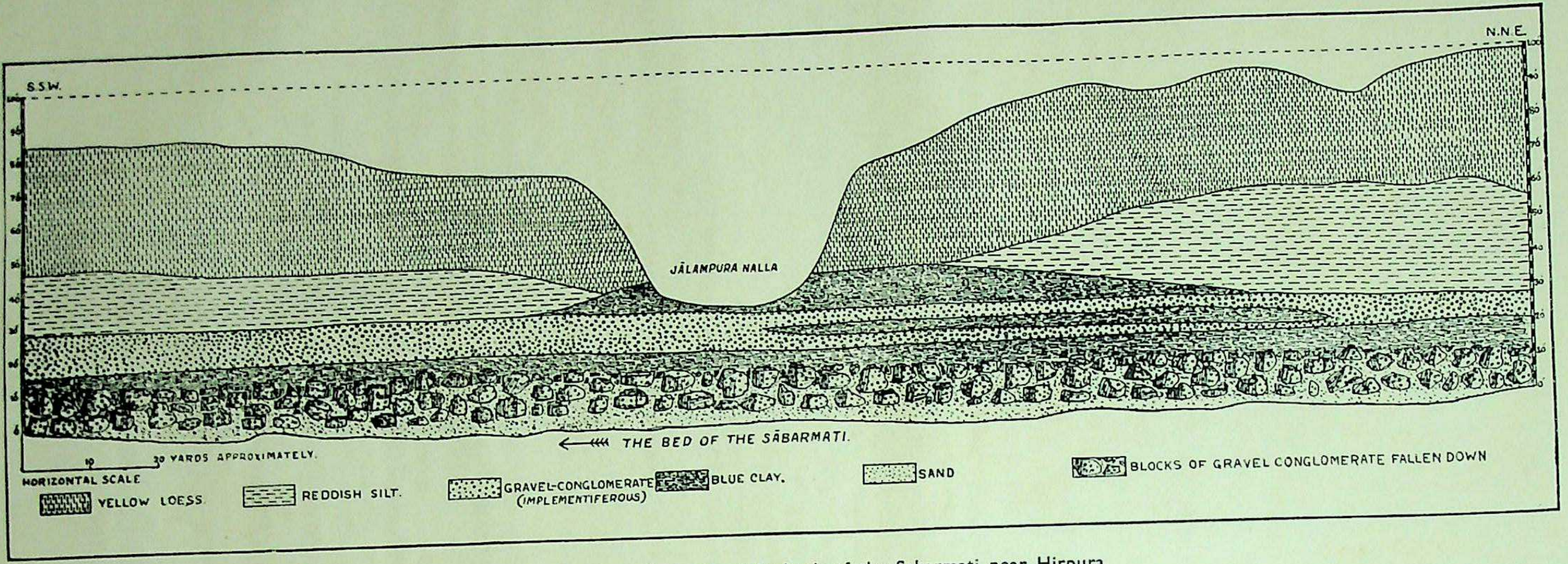
4 FOOTE, *op. cit.*, pp. 86-7, pl. iv; SHAH, *op. cit.*, p. 61, pl. iv. here Fig. 1.
5 Pl. V and XX.
6 Pl. XX (8).
7 Pl. V (2) and XX (4).
8 See SANKALIA, "Pre-and Protohistory of Gujarat" in *The Glory that was Gurjaradeśa*, pl. II.

Fig. 1.



Transverse section across both banks of the Sabarmati between Kot and Sadolia (after Foote, *The Geology of Baroda State*, pl. iv).

Fig. 2.



Longitudinal section along the right bank of the Sabarmati near Hirpura.

is sub-triangular with the longer ends convex and sides bulging out; underside is the primary flaked surface with a fine bulb of percussion at one end. The upper side is chipped, probably by "step" technique, and has three gently sloping platforms. The second specimen, No. 3247-48 called the "Madras type" axe, is a cleaver, with a U-shaped butt-end; the opposite end sloping, with a straight edge. The undersurface is practically smooth, while the upper is flaked, principally around the edge, leaving the central portion intact, though not with the original cortex. Both the specimens are fresh with sharp edges.[9]

Chief features of Kot Tools

Our finds were made *in situ* in the conglomerate whereas FOOTE's were made in the river bed, but he believed, and rightly, that they were washed out of the shingle (i. e. conglomerate) bed. Thus the Koṭ palaeolithic industry comprising hand axes and flakes belongs to the period when the conglomerate was being formed, the specimens having been made at that period or just before it. Looking to their technique they postulate an advanced stage in stone chipping: Levellois-like flakes, and core-tools, flaked with free and even controlled method, and regular, sharp edge around the implement.

MAHURI

About four miles higher up than Kot-Sadolia is Mahuri (Mahuḍi, 72° 50′ and 23° 30′)[10]. Because of the greater depth of the loess deposits, the right bank is very high here, while the left bank is very low, almost a level with the plain. The gravel bed is also lateritized and overlies the basal bed of bluish clay. Several hours search proved unproductive.

HIRPURA

Hirpura (72° 47′ and 23° 32′)[11] was the next site we visited. It is about 9 miles higher up from Mahuri, and a little over four miles to the north-east from Vijāpur. From the village a walk of over a mile or more first over sandy, thorny road, and then through deep gullies leads us out on to the right bank of the river. The river bed is here about a quarter mile wide, but a fairly good channel of water flows close to the right bank. The latter is indeed high but not throughout cliff-like; the left is a low rounded mass. From the Hirpura gully southwards, the right bank rises nearly to a height of 100 feet; while northwards, the river has encroached inside, creating a sandy peneplain, and eroding the steep bank. Hence the southern portion of the bank, for a distance of one mile up to Jālampura[12] gully, is important for study.

From the Hirpura gully, a small footpath over a narrow talus takes us to the spot where the steep bank is clearly exposed, the talus broader and covered by numerous blocks of gravel conglomerate detached or washed out from the gravel bed. Since the latter was at a great height forming part of the steep bank we could only examine the gravel blocks lying on the talus. From two of these blocks we were able to collect a flake and a cleaver.

9 For illustrations of both of these see SANKALIA, *op. cit.*
10 Survey Sheet. 1″=1 mile. No. 46 A/11 × 15.
11 *Ibid.* 46 A/10 × 14.
12 This name is not mentioned in the map.

Since these implements were found *in situ* in the gravel conglomerate blocks, their stratigraphic position would be the same as that of the conglomerate bed itself. This is shown by a section.[13]

The section reveals that the same beds which were noticed at Kot-Sadolia and Mahuri continue up to Hirpura, almost unchanged, the only noticeable features are that the gravel is not lateritized here, and patches of bluish clay are found intercalated in the gravel bed as well as reddish silt. The gravel, wherever it is freshly exposed, is whitish grey; elsewhere it is weathering into darkish grey.

Besides the two implements mentioned above a few pebble tools were picked up from the reddish silt. The chief characteristics of all these tools are described below:—

FINDS FROM HIRPURA

From Gravel Conglomerate Blocks

No. 6 Roughly pointed ovate, cleaver-cum-hand axe; fresh; wavy, rather irregular outline; flaked all over on both sides leaving a tiny patch of cortex at the cleaver-end in a corner; the cleaver-end has broad sloping platforms, slightly concave or deeply flaked, on one side, and convex on the other, with rounded oblique edge pointed at one end. The hand axe-end is acutely convex, marked by steep flaking on one side and broad flake scars, with a little retouch (?) on the border.[14]

No. 7 Small sub-triangular, flake; arrow-head like; upper surface has two broad platforms, made by a curved mid-ridge, and a small platform near the pointed end; primary flaked undersurface, with a prominent bulb and a faceted but obtuse-angled platform on the butt-end. The point is blunt and sides not sharp, but sinuous owing to use (?).[15]

Pobble Tool-like finds, from Reddish Silt

No. 13 Oval pebble chip.

No. 14 Portion of a flat-bottomed pebble, fractured crosswise, and then perhaps slightly chipped.

No. 15 Flake, flat-bottomed; part of an oval pebble.

No. 16 Portion of a flat-bottomed oval pebble, split crosswise and perhaps slightly chipped upwards from the fractured surface.

No. 17 Crescent-shaped pebble chip.

No. 18 Portion of an oval pebble with a flat undersurface; upper surface has cortex, but is steeply flaked on one side to make a sharp edge by its intersection with the underside.

No. 19 Portion of a flat-bottomed pebble, rounded on face; split crosswise, and the fractured surface perhaps chipped.

No. 20 Large flat-bottomed oval pebble, with truncated ends and chipped slightly around the border on three sides.

No. 21 Flat-bottomed elliptical pebble chip.

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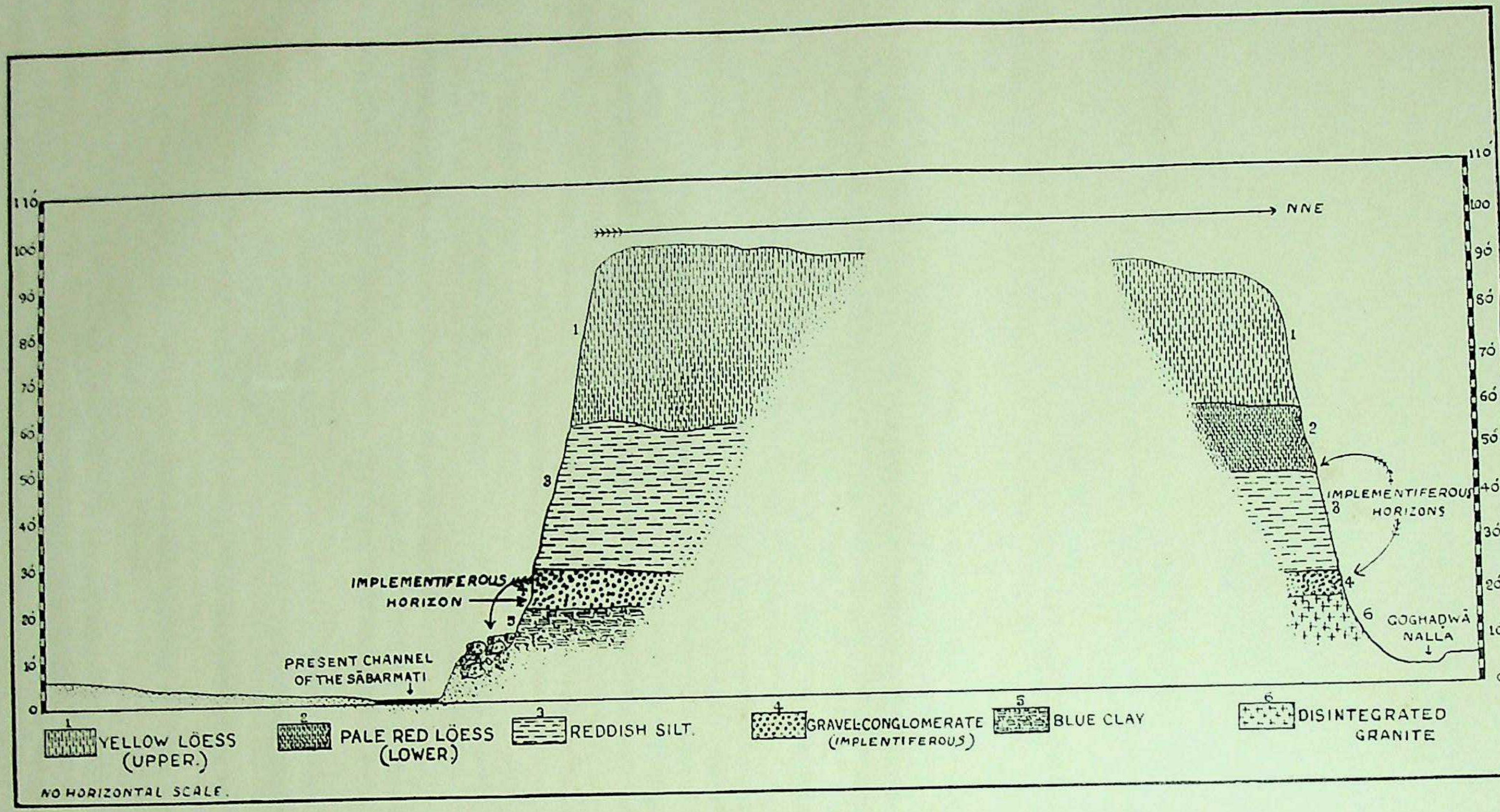
13 See Pl. I (a) and Fig. 2.
14 See Pl. V and XXI (1).
15 See Pl. V and XX (5).

Fig. 3.



Transverse section across the right bank of the Sabarmati from the spot in the fig. to Goghadwa Nala.

Main features of Hirpura Tools

The gravel conglomerate specimens, though only two, indicate that already at the time of the gravel deposition the flake as well as the heavy tool industry, represented by the cleaver, was well advanced and marked by a neat form in which "step" flaking was common.

The specimens from the reddish silt are all of cruder type, though they look like pebble tools; the only genuine tools are perhaps: Nos. 8, 12, 16, 18, 19 and 20.

GHADHARA NALA (RAVINE)

While returning from the microlithic 'mound', or the so-called 'Hirpura plateau' of FOOTE, to the south of Derol, through the Goghaḍwā's (*no*) *ogho* (ravine)[16], a palaeolith-like flake was found at the junction of the loess and reddish silt. This led to the examination of the Nala, called Ghadhara (Ghadhaḍa), from the village to its north (72°51' and 23°36'). This fairly wide Nala, is one of the largest, having high cliff-like banks. It runs at right angles to the main river and presents a very antique appearance—as if it were one of the old beds of the river. Particularly this is true of its gravel bed, which, at places, where its upper layers of fine silt and loess are washed away, presents, owing to a long period of weathering, a dark grey appearance.[17] This gulley again confirmed the stratification observed at Hirpura, viz., a bed of disintegrated granite (?) overlying the basal granite bed, which was not visible; over this a bed of polygenetic gravel conglomerate, consisting of feldspars, chert, etc. weathered grey on the outside. Over this a reddish layer of silt covered by a huge deposite of yellowish loess.[18] Here about 24 specimens were collected mostly *in situ* by Chatterjee and Krishnaswami. These include a few pebble tools, early and late types of hand axes and some early Levellois-type flakes. Important features of these groups are summarized below.

FINDS FROM GHADHARA

These fall into:-

(A) Rolled or thickly encrustated with carbonate of lime and silt. G. 32, G. 28.

(B) Fresh.

On typological grounds they are divisible into :—

1 Hand axes:
  (a) Ovate (i) Regular ovate, Nos. 25, 26, 30 and 38.
  (ii) Irregular ovate, Nos. 31, 28, 42.
  (b) Triangular (i) Both ends regular, lozenge-shaped, No.32.
  (ii) Sub-triangular, No. 37.
  (iii) Sub-triangular with fish-tail-like butt-end, No. 27.

2 Cleaver, No. 26.

3 Pebble Tools (?)
  (i) Genuine, Nos. 24, 29, 40.
  (ii) Doubtful, Nos. 39, 41 and 49.

4 Flakes (i) Levellois-like, Nos. 35 and 48 (?)
  (ii) Ordinary, nondescript, Nos. 36, 43, 44, 45 and 46.

16 For its exact location see Survey Sheet 1" = 1 mile. No. 46 $\frac{A}{10 \times 14}$

17 See Pl. I (b).

18 See Fig. 3.

HAND AXES [19]

No. 25 Ovate hand axe; neat, regular edge, point bevelled on one surface, rather roughly flaked by "step" technique, leaving a patch of cortex on butt-end.

No. 30 Small ovate hand axe; wavy edge; very roughly flaked by "step" technique on one face, lightly on the other leaving a tiny patch of cortex on the end opposite that of the butt, and large patch on the butt.

No. 38 Small ovate hand axe on thick flake; edge wavy but only on part of the tool; one side roughly flaked, other partly near the point and on one side, leaving much of cortex.

No. 31 Irregular ovate hand axe, edge sharp at point, but irregular; rough "step" flaking with cortex on butt-end.

No. 28 Ovate, irregular in this, that on one face it is pyramidal with large flake scars meeting at a central high point; the other face is slightly convex; wavy edge around; flaked all over the convex face, on the other by deep "step" cuts towards the centre.

No. 42 An elliptical piece, broken from back, on flake.

No. 32 Diamond or lozenge-shaped; the object is thickly encrusted with whitish film of carbonate of lime, and even now forms part of the gravel.

No. 37 Sub-triangular hand axe on thick flake; underside primary flaked surface; upper partly flaked, leaving a ridge at one end; cortex around the border of the edge.

No. 27 Sub-triangular, fish-tail-like hand axe, wavy, sharp edge almost around; rough "step" flaking all over with bulging centres and sloping ends pointed at one end, and straight-edged on the other.

No. 26 (This was included in ovate hand axes but because of its straight edge on one end may be considered) a U-shaped cleaver. It has not got edge around. *On one arm it has blunted flat side, which is an uncommon feature in cleavers.* Otherwise it is flaked all over, with sloping faces forming a straight, now sinuous edge.

PEBBLE TOOLS

No. 24 An oval pebble, flaked on both faces, keeping the pebble cortex around the border with one end sloping.

No. 29 Similar, but the find is bigger, and has a sharper edge.

No. 40 A flat-bottomed oval pebble split longitudinally; perhaps subsequently retouched on the fractured side.

No. 39 Part of a round or an oval pebble, fractured or flaked on three sides.

No. 40 Part of a flat-bottomed oval pebble.

No. 49 Flat-bottomed pebble, slightly chipped off at one end.

FLAKES

No. 35 A thick discoid-like flake; underside primary flake surface with bulb(?); Upper slightly flaked, leaving cortex on one side.

No. 48 A quadrant with bulb on undersurface, upper irregularly flaked.

19 See Pl. VI and Pls. XXI (2, 3, 4, 5) and XXIV (1).

No. 36 A large semi-circular flake; primary flaked undersurface; partly concave edge.
No. 43 A thick nondescript flake, having no clear edge.
No. 44 Thick semi-circular flake; upper surface has a deep "step" scar, and cortex on either end; sharp convex edge.
No. 45 Similar to No. 43 in shape; underside has cortex, upper has a parallel flake scar.
No. 46 Semi-circular; convergent scars on face, primary flake under surface; possible platform. (This flake was found high up at the junction of the alluvium and loess in Goghaḍwā-*no-ogho*).

Chief features of Ghadhara Tools

These tools on grounds on flaking technique, outline and form may be grouped into

(a) Irregular outline, rough, crude flaking, with patches of pebble cortex at no definite place. Nos. 31, 27, 38 and 37.

(b) Regular outline, comparatively neat "step" flaking with a patch of pebble cortex at definite places. Nos. 24, 26, 28, and 30.

No such clear division is visible in pebble tools and flakes. The former have been already classified to into genuine and doubtful; the latter according to their flaking technique into Levallois-like and ordinary.

PEDHAMLI

The second important site after Kot-Sadolia was Pedhāmli (72° 52′ and 23° 40′)[20]. Here FOOTE had found a rolled pointed oval hand axe, No. 3309 of his *Catalogue*[21]. Pedhamli is above Hirpura, about 8 miles to the north if we go along the river and about 6 and 13 miles on the cart track from Hirpura and Vijāpur respectively. The village on the right bank is called Pedhamli; that on the left, a little in the interior, is called Karoli and is in Idar State. The river is not very broad here, less than two furlongs, and has a higher and steeper bank on the right side, close to which the main stream flows[22]. The left bank is very much eroded, broken, obviously by river floods showing the weathered gravel bed, at places detached and its huge blocks overlying the variegated layers of sandstone and shale.[23]

These features are also seen on the right bank which is cut up by a number of gullies, and the examination of one of these was so richly rewarded by finds that it was decided to survey both banks of the river a few miles up-and down-stream. Accordingly the area was split up into localities as follows.

(1) Pedhamli, including the gullies on its right bank for a distance of about a mile from the old Shiva temple on the top of the bank; the finds bear the abbreviation P.

(2) Pedhamli-Karoli, the section of the river opposite to (1) above on the left bank; the finds bear the abbreviation PK.

20 Survey Map, 1″=1 mile 46 $\frac{A}{10 \times 14}$

21 FOOTE, *Notes*, pp. 16 and 142; *Catalogue*, p. 208; *GBS.*, p. 87.

22 See Pl. II (a) and (b)

23 See *ibid.*

(3) The area beyond (1), particularly the gully, opposite a temple on the left bank, is called "Pedhamli, opposite the Temple", abbreviated into PT.

(4) Pedhamli–Phudera, the section and the gullies near the village of Phudera (73° 42′ and 23° 51′) about 2½ miles north from Pedhamli; it is abbreviated into PP.

(5) Pedhamli–Rāmpur, after the village of Rāmpur, 3 miles distant from Pedhamli, abbreviated into PR.

For stratigraphical studies the right bank, particularly the section below the Shiva temple is well exposed. Here one notices, two new features.[24] The lowest stratum viewing from above consists of shale and sandstone respectively, whereas at previous sites[25] it consisted of disintegrated shale (blue clay) only. Secondly the stratum overlying this, is laterite; the gravel conglomerate lies above laterite, and not directly over the shale. These features were observed by us at places up to Rampur in the north, whereas FOOTE had noticed them as far north as Virpur, along with the basal bed of granite.[26]

Since numerous finds were collected particularly at localities (1, 2, 3) mentioned above, the general stratigraphy of the area is shown by a large section (Figure 4).

The finds from the entire area are first grouped together and discussed stratigraphically, indicating at the beginning the main types and sub-types of finds from each stratum and further details are given subsequenty. Then follows a comparative study between finds from two strata and finally conclusions on the Pedhamli industry as a whole. Usually details of the depth at which a given find was made are given, but these are, and can be only approximate.

The finds are accordingly divided into three classes.

Class I includes all finds from the gravel conglomerate.

Class II includes all finds found at the junction of the gravel conglomerate and overlying alluvium [reddish silt]

Class III includes all finds collected from the alluvium [reddish silt].

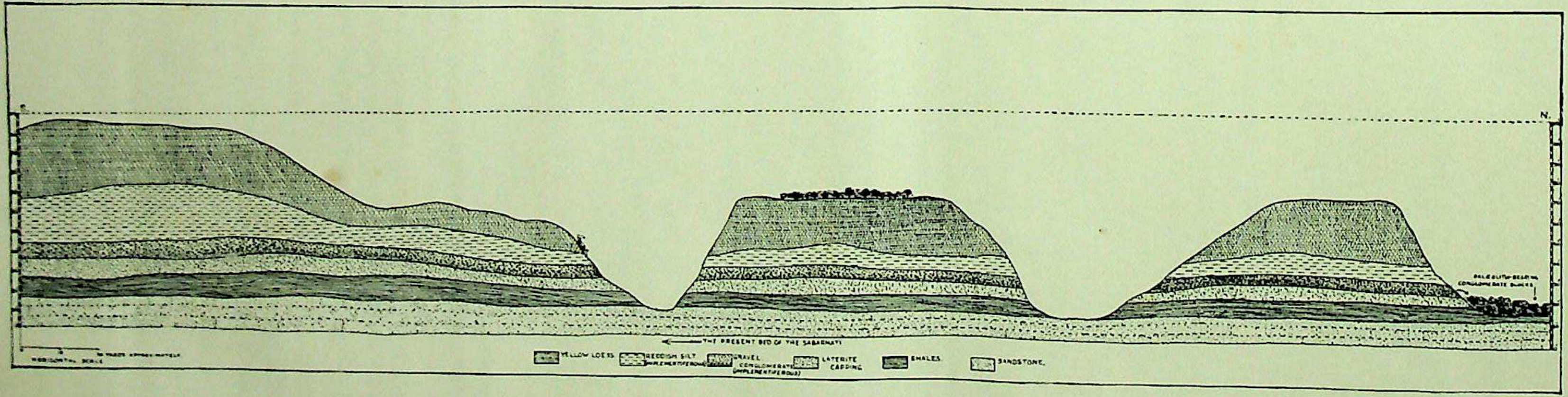
Finds from Gravel Conglomerate

Finds from this level, the first Sabarmati stage, were made at various depths in the gravel which is at an average 10 feet in thickness in all the localities at Pedhamli. Since the approximate position of each find in the gravel was noted, the finds have been arranged in an ascending series, though, one has to make allowance for the rate of gravel deposition, which may not be similar at all places along the bank, but may vary according to speed of the stream and height of the bank. That is, the formation of a gravel or alluvium stratum is not exactly indentical with that of buildings or cities. It is not possible therefore to regard the various depths at which finds are made as distinct substrata.

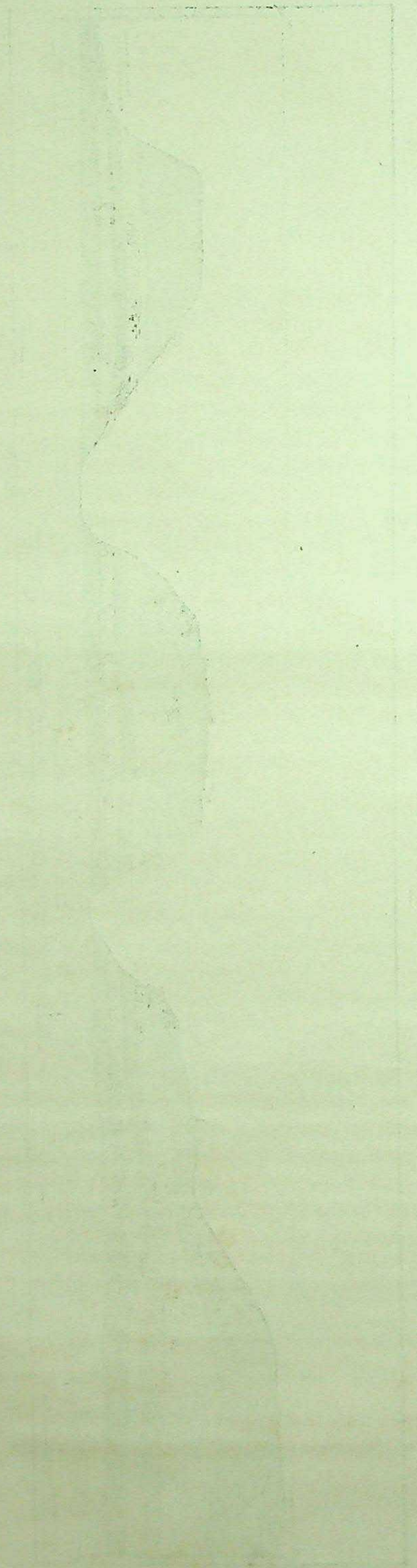
The natural condition of finds first classifies them into (A) Rolled and (B) Fresh.

24 For details see Fig. 4.
25 See Figs. 2 and 3.
26 Cf. FOOTE, *op. cit.*, p. 68; SHAH, *op. cit.*, p. 61.

Fig. 4.



Longitudinal section along the right bank of the Sabarmati at Pedhamli.



Patination is also a consideration, but in the case of quartzites, it is not so easy to detect these chemical or molecular changes as it is in flint. Very often the alteration of the surface seems to be due to contact with the deposit in which the implement is found, which is really staining and not patination.

The implements are then classified according to their shape and character.

I Condition of implements

(A) Rolled: P. 196, P. 197.
(B) Slightly rolled: P. 60, PP. 210; PT. 201
(C) Fresh: Rest.

II Types of Implements

1 Hand axes[27]: Sub-types:

(a) Oval, P. 56 and P. 55.
(b) Ovate, P. 66a and P. 139.
(c) Pear-shaped, P. 53, P. 130 and P. 230.
(d) Pointed triangular with butt-end heavy (and thick), Lancelote hand axes of La Micoque type, PK. 179, PK. 181 and PK. 184
(e) Pointed sub-triangular, P. 52.
(f) Arrow-head-shaped and "hafted" (?), PT. 201
(g) One of the above types, but perhaps natural specimen.

2 Cleavers[28]: on large flake, irregularly U-shaped butt-end and oblique edge, P. 58 and PT. 195.

3 Scrapers[29]:

(a) Discoid on core, P. 60.
(b) Ovate on core, PP. 210.
(c) Semi-circular on large flake, PT. 229.

4 Pebble Tools:

(a) Genuine, Choppers.
  (i) Round-bottomed, partly flaked, P. 243, PK. 187.
  (ii) Flat-bottomed, P. 66 (?)
(b) Doubtful
  (i) Split Pebbles, P. 65, PT. 235, P. 105, P. 59.
  (ii) Tortoise-shaped, PT. 220.
  (iii) Pointed hand axe-like, P. 57, PK. 185, P. 125.

5 Flakes[30]: Small and Thin.

(a) Real Implements, P. 68a, P. 147, P. 77, P. 62 (?) P. 209 (?)
(b) Pebble chips, P. 114, P. 156, PK. 193, P. 167, P. 62, P. 233 (?)

Of 5(a) some are Levallois-like, P. 68a, P. 147, P. 62 (?); P. 77 is like a small hand axe having fully flaked sloping back. Others are nondescript.

27 Pl. VII. 28 Pl. VIII (1-2). 29 Pl. VIII (3). 30 Pl. VIII (4).

Find from Gravel Conglomerate (arranged in ascending order)

Level	Locality & Number	General nature
Base of conglomerate bed	P. 243	Huge chopper, with a wavy edge on half of its periphery, large flake scars by crude "step" technique: the rest of the surface has coarse pebble cortex.[31]
8 feet in gravel	P. 59	Cleaver-like, convex-edged flake; perhaps natural; very little signs of retouch on one face which has cortex. Cf. Cobblers tool in shape. (It is called *Rāpi* in Marathi)
6 feet in gravel, in gully	P. 56	Oval hand axe, wavy and comparatively neat outline, partly flaked by crude "step" technique; one half of the surface on one side has cortex.
5 feet in gravel, in gully	P. 60	Discoid, scraper (?), fairly regular outline, flaking partly (?) by "step" technique, leaving a patch of cortex in the centre on both surfaces. Slightly rolled.
4 feet in gravel	P. 55	Oval hand axe, part of cortex on one side near the butt-end. Similar to P. 56.
4½ feet in gravel	P. 61	Thick hand axe-like pointed flake; perhaps natural.
4 feet in gravel	P. 66	Chopper (?), flat-bottomed, elongated pebble, broken at both ends; one end sloping and pointed at edge (?).
4 feet in gravel	P. 105	Split pebble flake, natural (?)
5 feet in gravel	P. 68a	Semi-elliptical, plain faced, steep sided flake; smooth flaked under surface with bulb and faceted platform(?); Levallois-like.
5 feet in gravel	P. 62	Roundish flake, with a bulb of percussion on the under surface, and striking platform; cortex on the upper surface.
4 feet in gravel	PT. 231	Triangular hand axe, very rough; natural (?)
4 feet in gravel	P. 114	Triangular flake, pebble cortex at the butt-end.
3 feet in gravel	P. 66a	Ovate hand axe; neat edge almost around, though flaking rough and partly by "step" technique; cortex on face at the butt-end.
,,	P. 52	Pointed sub-triangular, straight-based, hand axe, flaking very rough and uneven; cortex on butt-end; point broken(?), awl-like.
,,	P. 58	Broad U-shaped cleaver-on-flake(?), comparatively thin; fully and neatly flaked on both faces, partly by "step" technique; edge oblique, its protruding part at one end broken.
,,	P. 53	Pear-shaped hand axe on thick flake(?) Fully flaked, regular outline; signs of retouch on one side, by "step" technique.

31 See Pls. VII–VIII (1–4), and XX–XXII.

Level	Locality & Number	General Nature
3 feet in gravel	PT. 229	Scraper ? semi-circular, thick at one end and sloping at the other.
2½ feet in gravel	PK. 179	Pointed triangular hand axe on very thick flake(?), flaked undersurface further chipped; cortex on most of upper surface, but roughly chipped, near the edge on either side.
In mid-gravel	P. 139	Ovate hand axe. Similar to 66a; cortex at butt-end.
In hard gravel	P. 130	Pear-shaped hand axe; fully flaked, partly by "step" technique; cf. P. 53 above.
"	P. 125	Heavy lateritized triangular, curved-pointed hand axe, natural (?)
"	P. 154	Discoidal core; three flake scars on side.
2 feet in gravel	PK. 181	Pointed triangular hand axe; (Lancelote of La Micoque type;) heavy and large butt, elongated point; fine wavy outline, fully flaked, partly by "step" technique, retouch on edge.
2 feet in gravel	P. 65	Flat-bottomed pebble, split on one side, and subsequently flaked(?) upwards.
2 feet in gravel	PT.	Rough, rostrocarinate-like(?)
1½ feet in gravel	PK. 184	Pointed triangular hand axe on thick flake; primarily flaked undersurface; upper surface slightly flaked at the edge on both sides.
1½ feet in gravel	PK. 195	Long U-shaped cleaver on flake; primary flaked under surface slightly further chipped; cortex on ¾ of upper surface.
1 foot in gravel	P. 57	Similar to P. 125, but not lateritized.
1 foot in gravel	PK. 187	Flat-bottomed oval pebble, split crosswise and further chipped on either side to make an edge.[32]
1 foot in gravel	PK. 235	Oval pebble, slightly flaked on one side.
Gravel surface (embedded)	P. 230	Small, pointed ovate hand axe; neatly flaked all over, sharp, regular outline.
Do.	P. 225	Ovate hand axe with a cleaver-like straight edge; characteristic angle at the base on one surface.
Gravel surface.	PT. 201	Arrow-head shaped hand axe (?), fully flaked, broad sloping side, with a concavity at one end suggesting hafting; thick and dull pointed at the other; slightly rolled.
"	PT. 220	Tortoise-shaped heavy tool (?), no clear signs of flaking.
"	PT. 206	Pointed pebble tool.
"	PT. 197	Rolled ovate hand axe on flake (?)
"	PK. 185	Elongated diamond-shaped heavy tool (?)
"	PK. 193	Flake scraper; few subsequent signs of chipping.

32 These may be compared with Early Soan pebble tools.

Chief features of Pedhamli Gravel Tools

Though the so-called stratification of each tool is known, so that it is possible to arrange all the finds in an ascending series, still no typological evoluation is evident. From this point of view a curious mixture is visible in all the three principal divisions of tools viz., hand axes and cleavers, flakes and pebble tools.

The first, hand axes, may be grouped on the ground of flaking technique into two main classes:

(a) Irregular outline, rough flaking, and patches of cortex; P. 56, P. 55, P. 66a, P. 139, P. 52.

(b) Regular outline, neat flaking, clean and definite patches of cortex, if at all; P. 53, P. 130, P. 230 and PK. 181.

Almost similar division is apparent in the two cleavers, P. 58 and PK. 195, both from different levels and different sub-localities.

The flakes are likewise divisible into

(a) Levallois-like, P. 68a, P. 147, P. 62.

(b) Simple.

Similarly the discoids and other heavy pebble tools fall into

(a) Regular edge around the periphery; P. 60, PP. 210.

(b) Edge almost half the periphery; P. 243.

(c) Crude or roughly chipped or fractured naturally.

Finds from the Junction of Gravel Conglomerate and Alluvium

I Condition of Implements

(A) Rolled: P. 153, P. 227, P. 228, P. 232.

(B) Slightly rolled: P. 128, PT. 203.

(C) Fresh: Rest.

II Types of Implements

1 Hand axes, sub types:—

(a) Incomplete ovate hand axe, P. 202, P. 229, P. 130

(b) There are no real oval or ovate hand axes as from the gravel. P. 137, P. 225 might be included under elongated ovates, but since they have small straight edges they are mentioned under cleavers.

(c) Pear-shaped, (i) P. 129.

(ii) Pear-shaped but with rounded, pebble cortexed butt-end, straighter sides and dull point. P. 133 and P. 228.

(d) (i) Pointed triangular, but with thinner and sharper point like that of a spear, P. 226.

(ii) Pointed triangular, but with front ridged and back sloping and not thick, P. 132.

(iii) Triangular, back broken, P. 235 A.

(e) (i) Sub-triangular with well rounded butt, P. 144, P. 200 } All on flake

(ii) Sub-triangular with irregular butt, P. 231. } All on flake

(f) Tortoise-shaped hand axe, P. 138.

33 See Pls. VII-IX and XX-XXII.

2 Cleavers:

(a) Cleaver and Scraper, the oblique as well as the side edge shows signs of use, P. 136.

Short, straight cutting edge, but thick rounded butt-end, P. 225. Short, bevelled cutting edge, butt-end rounded like an ovate hand axe, P. 137.

(b) Short and stumpy, with broad, straight edge, on thick flake, Nos. 142, 143.

3 Scrapers:

(a) Cores: (i) Circular, P. 173, P. 170, P. 169.
(ii) Elongated, P. 175.

(b) Flakes: P. 237, P. 239 and P. 234.

4 Pebble Tools:

(a) Cores: (1) Real, P. 172.
(2) Doubtful,

(i) Oval, flat-bottomed, P. 174.
(ii) Oval, flat-bottomed, split lengthwise, P. 219.
(iii) Oval, flat-bottomed, face three-fourths flaked, P. 236, P. 127.

(b) Flakes: (i) Real, P. 149.
(ii) Doubtful, P. 180, P. 151, P. 238, P. 148, PT. 232, P. 146, P. 137.

5 Flakes:

(a) Clactonian-like, with convergent flake scars on face, P. 159, P.160.
(b) Clactonian-like, with irregular flake scars on face, P. 164, P. 165, P. 236, P. 237.
(c) Blade-like chips (?) P. 237, P. 161, P. 166.
(d) Nondescript, P. 155, P. 157, P. 163, P. 238, and P. 240.

Detailed Description of Finds from the Junction of Gravel Conglomerate and Alluvium

(A) Rolled Tools:

P. 153 Sub-triangular, almost frog-like, hand axe (?) on thick flake ?

P. 227 Thick pebble chip.

P. 228 (Cleaver-on-flake), fan-shaped, straight sided, with almost v-shaped butt-end; cf. cobbler's tools and similar shaped specimen from gravel, No. 59.

P. 232 (Cleaver-on-flake), similar to P. 228, but is has slightly broader edge, and straighter butt-end.

(B) Slightly Rolled Tools:

P. 125 Ovate-like hand axe, front is ridged, back slops towards the butt-end; cf. P. 126.

P. 203 Cleaver-like hand axe, small straight, bevelled edge, broad rounded butt-end.

(C) Fresh Tools :

P. 126 Irregular pointed ovate hand axe; only part of upper surface freely flaked; all of the undersurface, but partly by "step" technique.

P. 202 Irregular ovate hand axe; cortex on butt-end and part of upper surface; undersurface slightly but fully flaked; flaking rough.

P. 229 Irregular ovate hand axe or scraper(?); thick cortex on one side of butt-end, the rest flaked away to form a steeply sloping sinuous edge. Signs of rough "step" technique on face.

P. 131 Pointed ovate hand axe; thick cortex as in P. 229; but edge wavy and more regular, with a pointed end, opposite the butt-end. Signs of "step" technique on the underside.

P. 129 Pear-shaped hand axe; fully flaked, partly by "step" technique; neat edge around, with a small patch of cortex on face near the butt-end.

P. 229 Pear-shaped or triangular hand axe with rounded pebble cortexed butt-end; straight sides with wavy edges, the front faintly ridged and dull pointed.

P. 133 Almost similar to P. 228, but slightly larger, with no patches of cortex on the undersurface, and bearing clear signs of "step" technique.

P. 132 Pointed triangular hand axe; the front or face has a mid-ridge and ends in small but dull point; the back slopes down towards the butt-end and retains the original cortex; the under is similar, but the features are not so sharp. Both face and underside bear clear and definite signs of "step" flaking; outline wavy but neat and regular.

P. 226 Pointed triangular hand axe, with thick, slightly rounded butt-end, having a patch of pebble cortex on one side. Both the sides, particularly the face, are very carefully flaked, so as to give a smooth even surface in very coarse, rough material, and a thin fine tapering point. The edge is slightly wavy, but straight and sharp. The undersurface retains a few signs of "step" technique. (Cf. the Lancelote hand axe of La Micoque type).

P. 235A Dull pointed triangular hand axe(?), now only the front remains. It has a faint mid-ridge and fully flaked plain undersurface.

P :144 Almond-shaped hand axe on thick flake; the face has a large patch of pebble cortex near the pointed end; the undersurface, perhaps primary flaked surface, is slightly retouched near the rounded butt-end.

P. 200 Sub-triangular hand axe on flake, face and back fully flaked, leaving a patch of cortex on the rounded butt-end. Front angular, with regular outline.

P. 231 Irregular ovoid hand axe on thick flake; face very unevenly flaked partly by "step" technique, leaving a ridge on one side, primary flaked undersurface with fine bulb; outline slightly irregular.

P. 138 Tortoise-shaped hand axe(?).

P. 136 Cleaver-like, oblique-edged, thick flake; secondary flaking on one side on face, slight chipping by use on the oblique edge.

P. 137 Oval hand axe-like cleaver; front has bevelled short edge; outline neat and regular; slightly rolled.

P. 225 Oval hand axe-like cleaver; face has steeply sloping, short, slightly oblique edge; rounded butt-end with cortex on face is roughtly flaked; on the back well; outline wavy but neat and regular.

P. 142 Cleaver, small, on thick flake; only front of face flaked; with a steep sinuous but straight edge; primary flaked undersurface.

P. 143 Cleaver, small, on thick flake with pyramidal face, having very steep, dull, straight edge, face roughly flaked; primary flaked undersurface.

P. 169 Discoid-scraper(?), small, wavy, flaked edge, almost round the periphery; pebble cortex on the rest, neat flaking partly by "step" technique.

P. 170 Discoid-scraper(?), similar to P. 169, but slightly bigger; both the sides, particularly the under have clear and definite signs of "step" flaking.

P. 175 Elongated, discoid-like scraper (?), outline wavy but not irregular and definite; crude flaking, partly by "step" technique.

P. 237 Discoid scraper (?), now only a semi-circular piece, (other half perhaps broken), sharp wavy edge, on half of the arch; dull on the rest; both surfaces flaked, partly by "step" technique.

P. 173 Discoid-scraper or chopper (?), wavy, flaked edge, almost round the periphery of the base, leaving a small patch of cortex at the butt-end; both the surfaces flaked partly by "step" technique, but the edge formed by the intersection of the steeply flaked sides, with the flaked undersurface; the upper surface has a plain platform.

P. 239 Discoid-scraper (?), almost similar to P. 173, but smaller (perhaps on a thick flake), and flake scars not so well faceted.

P. 234 Scraper, almost semi-circular, on thick flake, technique nearly similar to that noticed in P. 173 and P. 239, with this difference that the flaked side is not so steep nor its outline so well defined.

P. 233a Scraper, almost semi-circular, on medium sized flake; technique as in P. 234.

P. 152 Scraper, semi-circular, smooth pebble undersurface; upper partly flaked forming an edge as in P. 234.

P. 158 Scraper (?), heart-shaped, smooth flaked undersurface; steep, side-flaked front, and gently sloping sides; cortex on narrow butt-end.

P. 172 Chopper, round, wavy flaked edge, on half of its periphery; the rest has smooth original pebble cortex. Large "step" flake scars, showing that flaking was upwards from the split or flaked end.

P. 174 Chopper, now a semi-ovate, flat-bottomed pebble, flaked or fractured transversely.

P. 219 Chopper, now almost semi-circular, large flat-bottomed pebble, fractured longitudinally.

PT.236 Chopper, ovate flat-bottomed pebble, face almost wholly flaked or fractured, but very roughly, leaving pebble cortex on butt-end.

P.	126	Chopper, hand axe-like; ovate flat-bottomed pebble, face fully flaked.
P.	151	Scraper ?, semi-oval pebble chip (?), flaked on both sides with cortex on rim.
P.	149	Scraper, similar to P. 151.
PT.	238	Scraper (?), similar to P. 151; under side also has cortex.
P.	148	Scraper ? –Do–
P.	232	Scraper ? rectangular with one corner protruding, –Do–
P.	146	Scraper ? Small ovate, irregularly fractured chip ?
P.	150	–Do– –Do–
P.	157	Small ovate chip.
P.	155	Chopper (?), rectangular, on thick flake; plano-convex, pebble surface; flaked undersurface.
P.	234	Pear-shaped flake; thin, flattish, fully flaked on both sides; face has irregular mid-ridge; sinuous edge on sides.
P.	163	Ovate pebble chip, rolled.
P.	238	Nondescript chip.
P.	240	–Do–
P.	159	Flake, scraper (?), circular, large convergent flake scars on face, with a small ridge on one side; obtuse angled striking platform; flaked underside; edge broken and irregular. Clactonian-like.
P.	241	Flake, scraper (?), rectangular, well faceted, high face, steeply flaked broad edge, obtuse angled striking platform, primary flaked undersurface with bulb; edge neat and regular; "step" flaking on face. Clactonian-like.
P.	160	Scraper (?), semi-circular, partly flaked face, with pebble cortex on half of it; slightly bulbous, faceted under surface with platform; blunt edge.
P.	236	Flake, scraper (?), similar to P. 160, but face roughly flaked; underside similar to P. 160; edge wavy and blunt.
P.	165	Flake, scraper or blade (?), irregular crescentic; face has a deep "step" scar; bulbous primary flaked undersurface with obtuse angled platform; steep sides with fairly sharp edges. Clactonian-like.
P.	164	Flake-scraper (?), irregularly semi-circular; face smooth and almost flat; parimary flaked undersurface with prominent bulb and obtuse angled platform; sinuous, partly blunt, edge, with a protruding corner. Clactonian-like.
P.	237	Flake, scraper (?), irregularly semi-circular with thick angular back; face partly, roughly flaked; primary flaked undersurface with slightly erased bulb, and platform; blunt sinuous edge.
P.	161	Flake, blade (?), crescentic, steep side with sharp edge; doubtful specimen.
P.	166	Similar but pointed at one end. –Do–
P.	237	Flake, blade (?), sub-triangular, pointed sloping front with sharp side edges.

Chief features of Pedhamli Conglomerate-Alluvium Junction Tools

No question of sub-stratification affects the finds from the gravel-alluvium junction. On the evidence of flaking technique all the different types of finds may however be grouped as follows:

The hand axes fall into:

(a) Very irregular, imperfectly made; P. 126, P. 202.

(b) Irregular outline, rough flaking and patches of cortex; P. 131, P. 229, P. 133, P. 228, P. 231.

(c) Regular outline, neat flaking, clean and definite patches of cortex; P. 226, P. 132, P. 235, P. 200, P. 144.

Among cleavers such distinction is not visible. All seem to belong to group (a) of the hand axes.

The discoids are divisible into three classes. Class one, (a) P. 169, P. 170, P. 237, shows a neat wavy edge, almost around the periphery, a result partly of "step" technique. (No. 175 is rather a rough variety of this class).

In the second class, though the flaking technique is similar, almost over both the surfaces, still the edge as in (a) is not formed by the intersection of the sloping upper and undersurfaces but is formed by the intersection of the steeply flaked, almost at right angles, side of the pebble with the flaked, almost plain, under surface. P. 173 is the best specimen of this class, the other, inferior specimens are P. 239, P. 233, P. 234, (though not discoid).

To the third class belong two nondescript specimens, P. 152 and P. 158, which are not exactly discoid, but look thick flake scrapers.

Since flakes were many, but each having different shape, their classification was made on the ground of flaking technique, as has been already mentioned.

The genuine pebble tool, No. 172, shows the same technique as shown by the group (a) of the gravel.

Comparison between 'Gravel' and 'Junction' Industry

When compared with tools from the gravel, the absence of the real ovate or oval hand axes is apparent. Those which have been included in this group show the same kind of technique and form.

Though only one pear-shaped, hand axe is found in this level, it is almost similar, slightly inferior to the similar hand axes from the gravel.

In the triangular variety new sub-types appear. Though not similar in form to those from the gravel, in the regularity of outline and flaking technique they compare favourably with those from the gravel.

The cleavers show slightly different forms and are inferior in outline, and smoothness of surface to those from the gravel.

The discoids and flakes and the pebble tools exhibit the same technique as shown by similar tools from the gravel; only the gravel discoids seem to be comparatively rolled.

In short the same mixture of crude, and fine variety of core and flake tools is visible in the industry, from the gravel-alluvium junction.

Finds From Reddish Silt or Finer Alluvium[34]

The maximum height of this finer alluvium apart from the superposed loess layer varies from 30 to 40 feet. Since the finds were made at various depths, as in the gravel bed, it seems to be advisable with a view to noticing evolution in industry to classify them into three sub-groups, and discuss their features. We have accordingly

(1) Finds between 40 feet and 30 feet.
(2) Finds between 30 feet and 20 feet.
(3) Finds between 20 feet and 10 feet.
(4) Finds between 10 feet and surface.

Finds between 40 feet and 30 feet

I Condition of Implements

I (A) Rolled: 124a.
(B) Slightly Rolled: P. 141, PT. 231.
(C) Fresh: Rest

II Types of Implements

1 Hand axes: Sub-types:
(a) Ovate:[35] (i) Elongated, PT. 225.
(ii) Normal, P. 70, P. 141, P. 140.
(iii) Pointed, P. 134, P. 227.
(b) Elliptical, P. 230.
(c) Triangular with butt-end heavy and thick, P. 85; (cf. (d) of gravel).
(d) (i) Sub-triangular with one side angular, P. 180, P. 178, P. 135, P. 73, P. 207.
(ii) With both sides angular, P. 171.
(e) Tortoise-shaped, P. 124a, P. 186, P. 231 (?).

2 Cleaver-like: P. 199.

3 Scraper: (i) Cores, elongated: P. 84, P. 90, P. 96, P. 145 (doubtful ?).
(ii) Flakes, P. 190, PK. 191, P. 68 (?).

4 Pebble Tools:
(a) Genuine
(b) (i) Split Pebbles, P. 110, PK. 189, PR. 67, P. 98.
(ii) Chips: P. 102, P. 101, P. 108, P. 100, P. 89.

5 Flakes:
(a) Clactonian-like, P. 113, P. 187[36], P. 123, P. 162, P. 54.
(b) Ordinary, P. 79 (crescentic), P. 91, P. 194, P. 83 (?)

Detailed Description of Finds between 40 feet and 30 feet

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34 Pls. VIII (13–14), IX (9–16), X, XX and XXIII (a, b, c).

35 Pl. X and Pl. XXIII (a, b, c).

36 Pl. IX (9–13), and XX (11).

Level	Locality and Number	General Nature
4 feet above junction	PT. 225	Elongated ovate hand axe, with a very irregular edge, rough "step" flaking, particularly on face, cortex on rim around the butt-end.
40 feet below alluvium	P. 70	Ovate hand axe, neat wavy edge, flaking smooth, particularly on face; comparatively rough and by "step" technique on the underside; pebble cortex on butt-end.
35 feet below alluvium	P. 140	Ovate hand axe, wavy edge only on part of the periphery, deep "step" flake scars on upper and under surface, leaving a large portion of cortex on the upper surface and butt-end.
35 feet below alluvium	P. 141	Ovate hand axe on thick flake; the specimen is rolled.
35 feet below alluvium	P. 85	Triangular with heavy butt-end; wavy irregular edge; rough "step" flaking, particularly on the underside; low side ridge on upper side, merging into the pebble cortex at the butt-end.
2 feet above gravel	PT. 227	Pointed triangular with butt-end acutely rounded, and retaining the cortex; edge neat and regular; flaking partly by "step" technique.
35 feet below alluvium	P. 134	Small pointed hand axe, rounded butt-end; wavy edge, but neat and around; flaked all over, mostly by "step" technique.
4 feet above junction	PT. 230	Elliptical hand axe on thick flake; bevelled point.
4 feet above junction	P. 180	Sub-triangular hand axe; one of the longer sides has a sinuous edge; the other is angular; both these meet into a narrow, sharp point; flaking appears rough because the material is very coarse; the butt-end is also flaked and has a straight bevelled edge.
1½ feet above gravel	PK. 178	Sub-triangular hand axe on thick flake; edge and point almost similar to P. 180; flaked all over rather roughly and by "step" technique, around the edge.
4 feet above gravel	P. 135	Sub-triangular hand axe on thick flake; neat curved edge on one side and small, narrow point, underside primary flaked surface; a deep flake scar on face, and smooth sloping pebble platform on butt-end.
	PR. 207	Sub-triangular hand axe on flake (?), large flake scars on face, ending in a thick butt.
35 feet below alluvium	P. 171	Sub-triangular hand axe on flake; primary flaked undersurface with bulb; upper side has a flat triangular platform down which slope the sides; edges neat and regular; point blunt by use (?)

Level	Locality and Number	General Nature
40 feet below alluvium	P. 124a	Tortoise-shaped, natural, hand axe (?), smooth and polished on face due to weathering.
2 feet above gravel	PK. 186	Tortoise-shaped but irregularly ridged on face; natural (?)
4 feet above gravel	P. 231	Semi-circular thick flake; has a cleaver-like broad edge; perhaps natural.
2 feet above gravel	PT. 199	Ovate handaxe-cleaver; wavy, very irregular edge, rather broad and oblique at the point; very rough flaking by "step" technique, leaving a small, patch of cortex on butt-end.
40 feet in alluvium	P. 84	Elongated with a wavy irregular edge; lightly flaked on one face; leaving pebble cortex on half the surface; on the other side rough flaking away from the edge towards the centre.
35 feet in alluvium	P. 96	Similar in shape to P. 84; cortex on the whole of underside; upper has a trimmed steep side, which suggests that the specimen is an implement.
35 feet in alluvium	P. 145	Similar to P. 84, but perhaps only a pebble chip.
2 feet above gravel	P. 190	Rectangular flake, thick on one side having a cortex patch; other sides flaked to form a sharp edge.
„	PK. 191	Rectangular flake, thick on top and bottom, the former retains the cortex; sharp edge on sides.
4 feet above gravel	PR. 68	A thick ovate flake, roughly flaked on face retaining cortex on the butt-end, as well as on the tip of the narrow end; short, concave edge on one side, wavy on the other.
2 feet above gravel	PK. 194	A semi-thick ovate flake; rough primary flaked undersurface, with bulb erased, and platform; upper roughly flaked, leaving a cortex patch at one end; edge sharp.
40 feet in alluvium	P. 110	An ovate flat-bottomed and faced pebble, split breadthwise, no subsequent signs of chipping, natural, split pebble (?)
4 feet above gravel	PR. 67	A large oval flat-bottomed and faced pebble, split partly at one end on one side; natural (?)
2 feet above gravel	PK. 109	Similar to P. 110, but thicker.
2 feet above gravel	PK. 108	Similar to PR. 67, but smaller and thicker.
35 feet in alluvium	P. 98	Elongated oval pebble, split breadthwise.
„	P. 102	Almost round, large, thick chip.
„	P. 101	-Do-
„	P. 108	A flattish chip.

Level	Locality and Number	General Nature
35 feet in alluvium	P. 113	A rectangular piece; primarily flaked undersurface with bulb and platform. Upper flaked all over; edge blunt, but slightly retouched on one side. Clactonian-like.
,,	P. 87	A roundish piece, undersurface etc. as in P. 113; platform retains pebble cortex; upper surface roughly flaked, with cortex patch on the tip of the convex edge, which is blunt.
,,	P. 123	A rectangular piece, broad at one end; underside etc. as in P. 87; convergent flake scars meeting at a ridge on face, flake perhaps a blade (?). Clactonian–like.
,,	P. 162	A long blade-like piece; underside etc. as in P. 113; low mid-ridge on face; edge dull, point of blade broken.
,,	P. 54	Similar to P. 162, but edge irregular.
40 feet in alluvium	P. 79	A pointed semi-circular piece, smooth flaked undersurface, upper has a mid-ridge and sharp point on front half; the rear has a smooth sloping platform.
,,	P. 91	A flat discoid-like chip (?)

Finds between 30 feet and 20 feet and surface

I Condition of Implements

(A) Rolled.
(B) Slightly Rolled: P. 50, P. 92, P. 103
(C) Fresh.

II Types of Implements

1 Hand axes[37]

(a) Ovate: (i) Elongated, PT. 226a.
(ii) Normal, P. 103, P. 109.
(iii) Pointed, P. 78, P. 50, P. 75 (10′ in alluvium)
(b) Elliptical, P. 122.
(c) Almond-shaped, P. 69.
(d) Pear-shaped, P. 71, P. 51.
(c) Keeled, P. 82, P. 81, P. 116, P. 72.

2 Cleavers[38], P. 74, P. 98, P. 224.

3 Choper (Discoid and Elongated), P. 94, P. 99, P. 117, P. 205.

4 Scraper, (?)
Core, P. 86 (cf. from junction) P. 88, P. 76, P. 121.

37 Pls. X and XXIII.

38 Pl. VII (1 14–15) and Pl. XXIII (6, 9, 10).

5 Pebble Tools: (i) P. 95, P. 106, P. 111, P. 93, P. 97, P. 215, PT. 218, PT. 216, PT. 217, PT. 214, PT. 204, PK. 183.
(ii) Large chips, P. 104, P. 92, P. 107.

6 Flakes[39]: (i) Clactonian-like, PK. 182, PT. 208 (?) P. 112, PT. 223, P. 64, PK. 192 (Levalloisian-like)
(ii) Ordinary, P. 115, P. 213, P. 221, P. 222, P. 63.

Detailed Description of Finds between 30 feet and surface

Level	Locality and Number	General nature
30 feet in alluvium	P. 103	An ovate hand axe, point perhaps broken; wavy edge, large flake scars, edge flaked by "step" technique, pebble cortex on butt.
10 feet below alluvium.	P. 109	An ovate hand axe, back broken, irregular edge; flaked all over.
30 feet in alluvium	P. 122	An elliptical hand axe (?) on flake. No subsequent signs of flaking.
20 feet in alluvium	P. 50	A pointed flat-bottomed ovate hand axe; wavy edge on three-fourth of the periphery, flaked mostly along the boarder by "step" technique, leaving part of face, and most of undersurface with cortex.
30 feet in alluvium	P. 78	A small pointed ovate hand axe (?) on flake, underside primary flake surface; upper partly flaked.
10 feet in alluvium	P. 75	A small pointed oval hand axe, perhaps on flake; fine neat and wavy edge around, flaked all over, partly, particularly the edge, by "step" technique.
10 feet above gravel	P. 226a	A very large elongated ovate hand axe; neat, wavy edge, sharp around the point; flaked all over, partly by "step" technique, but in such a manner that it has a thin blade-like point and thick butt.
30 feet in alluvium	P. 69	Almond-shaped, almost flat, hand axe, perhaps on flake; sharp, perfectly regular edge around, beautifully flaked all over, "step" scars at places. The specimen is more like a disc than an hand axe.
"	P. 71	An elongated pear-shaped hand axe, point perhaps broken; neat wavy edge almost around, except at the butt, where a smooth patch of cortex is retained; beautifully flaked like P. 69.

39 Pl. IX (16).

Level	Locality and Number	General Nature
30 feet in alluvium	P. 51	A small pear-shaped hand axe; wavy edge, rough flaking on underside, face well flaked but partially, leaving cortex on the butt-end.
„	P. 82	Keeled oval hand axe, both surfaces have high-ridge; wavy edge around, pebble cortex on part of face.
„	P. 81	Keeled oval hand axe; mid ridge on one face only; other face unevenly flaked.
„	P. 72	Similar to P. 81, but it has a flatter under-surface.
„	P. 118	A smaller piece similar to P. 72, undersurface has cortex.
20 feet in alluvium	P. 74	A large U-shaped cleaver; has almost straight cleaving edge, and irregular edge around; beautifully flaked all over; cf. P. 69, P. 71 in flaking.
„	PT. 198	Cleaver, quadrant on flake (?); underside parimary flake surface, upper boldly flaked, leaving large scars, and pebble cortex on the rounded side; sharp sloping side with oblique edge.
„	PT. 224	A small, irregularly U-shaped cleaver, straight edge on steeply sloping sides, roughly flaked except at the edge, leaving cortex on the butt.
30 feet below alluvium	P. 94	Chopper, roughly flaked, leaving cortex on face and underside.
In alluvium	PT. 205	Similar to P. 94, but well shaped and better flaked, small patch of cortex on one side only.
25 feet in alluvium	P. 86	Scraper (?), pointed ovate; roughly flaked over face and underside, cortex on side, steeply flaked side.
„	P. 99	Almost similar to P. 86, but more roughly flaked; cortex on face
30 feet in alluvium	P. 88	Semi-circular, wavy edge on arc, thick at chord.
„	P. 117	Pointed ovate; slight subsequent chipping at edge on the primary flaked (?) underside and pebble cortexed face. cf. similar from 40 feet to 30 feet.
25 feet in alluvium	P. 76	Sub-rectangular flake, bulb and platform on underside, sharp edge by the intersection of the sloping upper side and underside; "step" flake scars on edge.
30 feet in alluvium	P. 121	A large semi-circular thick flake (?); edge on arc by secondary "step" chipping on border on both sides.

Level	Locality and Number	General Nature
30 feet in alluvium	P. 95	A flat-bottomed oval pebble, split side ways and at one end.
,,	P. 111	Similar to P. 95, but smaller.
25 feet in ,,	P. 106	A flat-bottomed oval pebble split at one end.
25 feet in alluvium	P. 97	A thick chip of a flat-bottomed oval pebble.
30 feet in alluvium	P. 93	A flat-bottomed pebble, roughly flaked on face.
30 feet in alluvium	P. 92	A fan-shaped thick flake (?); primary flaked underside; partly flaked, but now slightly rolled butt-end; the edge has a large concavity.
,,	P. 104	Similar to P. 92, but a pebble fracture, having no subsequent signs of chipping.
,,	P. 107	A small pebble chip.
In alluvium	PT. 218	A flat-bottomed and faced pebble, split breadthwise.
,,	PT. 215	Quadrant; flat, flaked undersurface; partly flaked face.
,,	PT. 217	Quadrant, flaked face and underside.
,,	PT. 214	An irregular pebble chip.
,,	PT. 216	An ovate piece, slightly flaked at one end.
,,	PK. 183	An elongated ovate pebble; rolled.
,,	PT. 204	A flat-bottomed piece.
Surface	P. 182	Long rectangular flake, primary flaked underside, with bulb and obtuse angled platform, the latter obliquely cut to form a point; steep side ridge on face, cortex on butt; slightly retouched edge on one side, original flake edge on the other, point broken (?). Clactonian-like.
,,	PT. 208	Rectangular flake, primarily flaked undersurface, steep ridge on side; cortex at either end.
2 feet in alluvium	P. 112	Irregular quadrilateral, flat smooth undersurface, sloping face, edges perhaps retouched.
In alluvium	PT. 223	Pointed ovate flake; flat, flaked undersurface; face cut obliquely on two sides to achieve a point.
River bed	PK. 192	Semi-circular piece; bulb and striking platform on under surface; flat platform and gently sloping sides on face, edge broken at places by use or rolling (?). Levalloisian-like.
Surface	P. 64	Small pointed ovate flake, smooth flat under side, steep sharp edged ridge; point and edges sharp.
In alluvium	PT. 221	Rectangular flake, cortex on butt.
,,	PT. 213	Square, flake, irregular edge on one side.
10 feet in alluvium	P. 115	Pointed semi-circular flake; no edge.
In alluvium	PT. 222	Nondescript flake.
Surface	P. 63	Pointed ovate flake.

As in the finds from gravel conglomerate, the finds from the alluvium or reddish fine silt have been first divided into

(1) Finds from 40 feet to 30 feet.
(2) Finds from 30 feet to surface.[40]

On typological grounds all hand axes from (1) do not fall into clear divisions as finds from the gravel; we may however divide them into (a1) and (a2).

In (a2) fall P. 70, P. 134, P. 227, P. 171, all having fairly regular outline, and patches of cortex, but not so well done as in (b) of the gravel or (c) of the Junction. The rest of the finds fall in (a1). Though these have irregular outline and rather rough flaking, some of them, P. 85, PK. 175 provide good specimens of "step" technique.

There are no good, clear, specimens of cleavers. One, PT. 199 resembles in shape similar ones from the Junction.

Discoids are of cruder variety. They have not got definite marks as those from the gravel or the Junction.

Flakes are of two types: Levallois-like and ordinary.

No real pebble tools are found in this level.

The finds from 30 feet to Surface on typological ground can be similarly classified:

The hand axes into

(a) Irregular outline, rough flaking, and large irregular patches of cortex, P. 103, P. 50, P. 51, P. 78, P. 72, P. 82, P. 81.
(b) Regular outline, neat flaking, clean and definite patches of cortex, P. 266a, P. 69, P. 71, P. 75, P. 122.

The cleavers similarly can also be classified into (a) and (b). In (a) we have PT. 224, PT. 198 and in (b) P. 74.

There are no good specimens of discoids, scrapers, or pebble tools. While most of these would fall into class (a), P. 76, a scraper, might be put into class (b).

The flakes have already been classified on typological grounds. A few of them, though from surface, show Levallois technique.

Pedhamli Palaeolithic Industry

The finds from Pedhamli, the largest number found anywhere in the Sabarmati Valley, have been noted in detail. Since they have been found at various depths, principally in three strata: in the gravel conglomerate, at the junction of gravel and the overlying fine reddish silt, and the reddish silt, called ordinarily alluvium, it may be pertinent to inquire whether any evolution in form and technique is visible in the Sabarmati industry. Turning to the chief characteristics of the finds from each stratum, it may be said that no real evolution in form and technique is visible. Already in the gravel we have implements showing neat regular outline, fine flaking both by "free" and "step"

40 These have not been further sub-divided, as there are very few finds from 20 feet to surface.

technique. And this is noticeable not in one type of finds but in all hand axes, cleavers, discoids, scrapers, pebble tools and flakes. This mixture of "superior" and "inferior" quality of tools is also seen in the finds from the Junction. The finds from the immediately upper lying stratum viz., 30–40 feet of alluvium are rather disappointing. It has no really "superior" type of tools, while the fine pebble tools and discoids are totally absent from this as well as the next stratum. But this stratum–the topmost–shows again a mixture of "sup erior" and "inferior" quality of tools in its hand axes and cleavers. Thus this tradition of fine and rough tools persists all through the three strata. Only if we regard the almond- and pear-shaped hand axes and the huge U-shaped cleaver with their almost perfect shape, and beautiful finish as decidedly better specimens then we may say that there is a slight improvement in the flaking technique in the industry from the topmost stratum, and that this suggests evolution in the industry.

WARSORA

After examining Pedhamli area, it was decided to survey a small section of the river lower down below Kot–Sādolia. The section between Warsora (72° 47′ and 23° 26′)[41] in the north and Delwād (72° 24′ and 23° 45′)[42] in south appeared promising, as here the right bank is cut up by a number of gullies. A part of this section, a mile or two from Warsora southwards belongs to a Thakor, Rajput Jorawar Singh, His estate forms a part of the Sabar Kantha State Agency; (it is now under Baroda).

From Warsora a fairly deep gully, named after the village, emerges on the right bank. The bank is not very steep nor high at this junction. But gradually as we go southwards to Delwād, it becomes steeper and higher. Just where it meets another gully, called Ambod Nala, the bank is about 70 feet, only the first 10 feet being loess, underlying it is 40 feet of alluvium, and below this is the gravel bed, about 25 feet from the river bed. While returning from Delwād Nala, we saw this Nala again at its higher reaches, and had the first view of a gully which itself was so highly eroded that it must be about 200 feet deep.

We collected five finds on that day from a section of the river between Warsora and Mātā Nalas. Their exact location and nature are discussed below.

Finds from Warsora

Level	Number	General Nature
15 feet above junction of blue clay and conglomerate; *in situ* gravel conglomerate.	No. 243[43]	A small pointed sub-triangular hand axe; wavy edge around; rather rough "step" flaking on both sides, leaving on the upper a patch of pebble cortex in the centre.

41 Survey Map 1″ = 1 Mile, No. 46 A/11X 15.

42 *Ibid.*

43 See Pls. V, (15) and XX (3).

Level	Number	General Nature
10 feet above Junction, Do	No. 245[44]	A very small triangular point on flake; bulbar side on the undersurface chipped, the upper surface is fully flaked, and shows three sections, made by a low mid-ridge, and transverse angular ridge at the butt-end.
4 feet above Junction; *in situ* conglomerate.	No. 244	A plano-convex rectangular flake, primary flaked undersurface, upper fully flaked into a fairly smooth surface.
15 feet above Junction of blue clay and conglomerate; *in situ* conglomerate.	No. 244a[45]	A pointed ovate, cleaver-like, hand axe on flake(?); edge on one side curved and sinuous, on the other side almost straight; large rough "step" flake scars over face, underside rather deeply flaked, leaving a high patch of pebble cortex on the butt-end.
Do	No. 247	Chopper (?), cylindrical flat-bottomed pebble, split breadthwise in half, the fractured flattish surface seems to have been subsequently slightly chipped.

Chief features of Warsora Tools

These few finds from the conglomerate at Warsora fall typologically into two classes as those from Pedhāmli. In (a) we have No. 243a; in (b) Nos. 244, 245. In No. 245 we have the finest point-on-flake.

HADOL

After surveying Warsora on the lower reaches of the river, it was decided to survey a locality on its higher reaches just after the river emerges into the plains of Gujarat. From an examination of the survey maps, Hadol[46] (72°51′ and 23° 57′) appeared a promising site. Here the Sabarmati, leaving the hilly tract of Southern Rajputana, including the States of Danta and Idar, comes down gradually into the alluvial plains, and has a high right bank cut up into ravines or gullies. Physiographic conditions were similar to those we had observed at Pedhamli and elsewhere in the middle reaches of the river, with this difference that towards the north and north-eastwards the country is distinctly hilly. We did not go beyond Hadol but confined our survey to the section of the river—almost a concave arch—from the gully at Navi (New) Hadol in the south to a little beyond the gully known as Juna Nala, at Juni (Old) Hadol, a distance of about two miles.

The river bed is about a furlong wide and the water flows almost in a channel close to the right bank, which is fairly high and steep[47], whereas the left bank is comparatively very low, nothing but a sandy heap.

44 See Pls. V (13–14), and XX (7).
45 See Pls. V (16) and XXI (15).
46 See Survey Sheet 1″ = 1 Mile, No. 46A/9 X13.
47 See Pl. III (a).

The finds were collected principally at two localities. The first locality was to the left or south of the New Hadol Nala. Here the bank is approximately 60 feet high. Only one find was made from this locality. The position of this bed is shown in Fig. 5.

The other locality was the area just north of the Juna Nala; as a matter of fact, the first important find was made at the corner where this Nala opens out on to the bank. The stratification of the bank is slightly different. Here for the first time the granite bed was exposed. It did not crop up in the river bed, but formed a fairly large part, about 15 feet, of the bank. Overlying it is the gravel conglomerate and alluvium layer, which is thinly capped by loess.[48] At some places the gravel substratum is eroded and the silty part of the alluvium directly rests over the granite bed.

At the second locality, called Juna Nala (JN), finds were made at various depths:

(1) Surface.
(2) Exposed on the granite or gravel surface.
(3) In the gravel conglomerate at various depths from the junction of loess and alluvium.
(4) At the junction of gravel and granite.

The finds from each of these are discussed separately beginning with the finds from the lowest stratum.

Finds from the Junction of Gravel and Granite

These are divisible into:–

(A) Rolled: Nos. 264, 264a, 266, 273, 277.
(B) Semi-rolled: Nos. 265, 269, 267, 276, 278, 279, 280.
(C) Fresh Nos.: 261, 263, 275, 268.

On typologic grounds these fall into:–

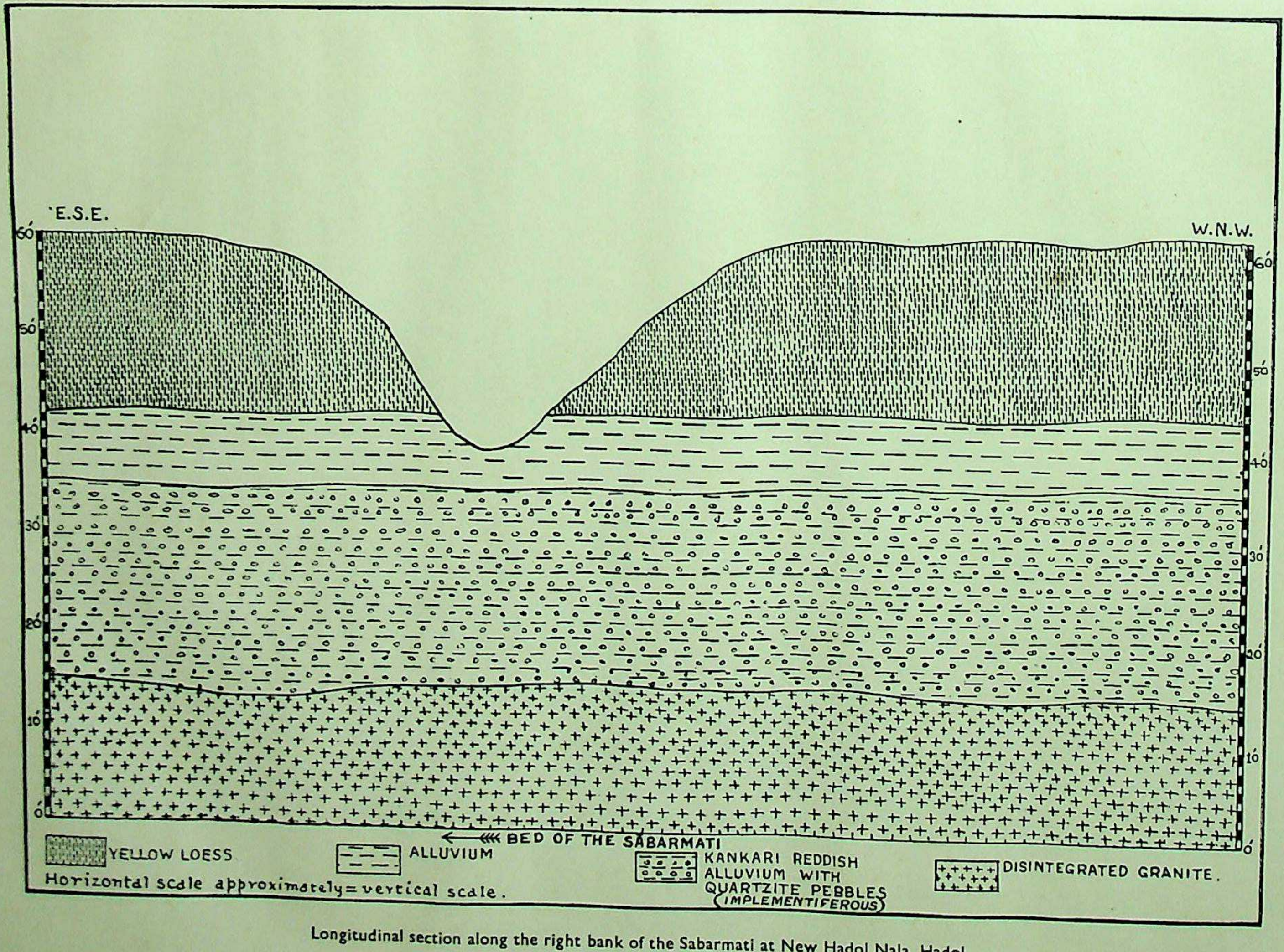
1 Hand axes,
  Ovate (i) Pointed ovate, No. 264.
  (ii) Ovate, No. 263.
2 Cleavers, Nos. 261, 264 a.
3 Discoids, Nos. 265, 269 and 276.
4 Pebble Tools (?)
  (i) Nos. 270, 271, 273.
  (ii) Chips, Nos. 262, 275.
5 Flakes (i) Levallois-like, Nos. 267, 279.
  (ii) Ordinary, Nos. 268, 277, 278.

Detailed Description

No. 264 Triangular or pointed ovate, very much like a hand axe, upper surface too much rolled; flat-bottomed; flaked or fractured surface; specimen doubtful.

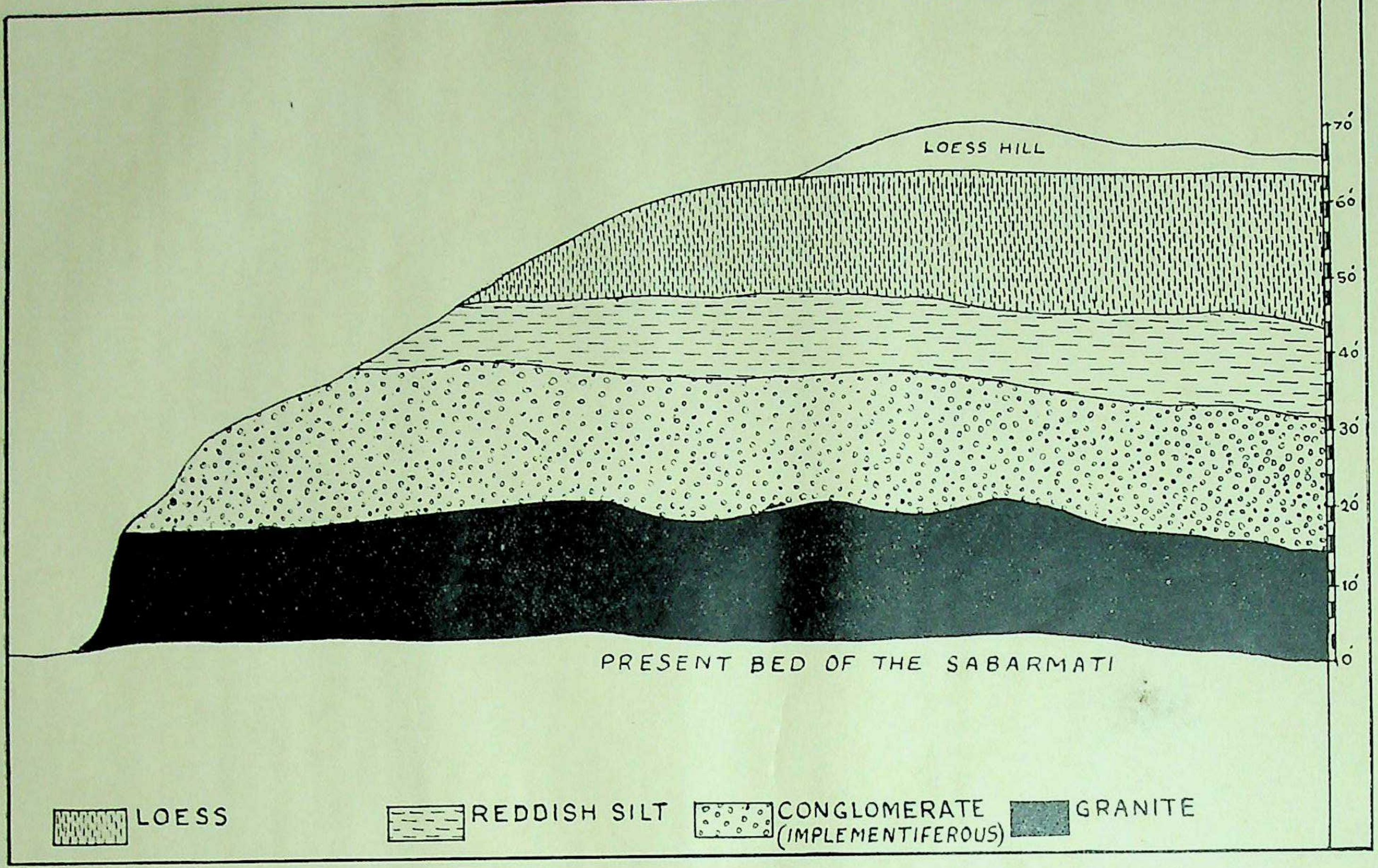
48 See Pl. III (a) and Fig. 6.

Fig. 5.



Longitudinal section along the right bank of the Sabarmati at New Hadol Nala, Hadol.

Fig. 6.



Longitudinal section along the right bank of the Sabarmati at Old Hadol Nala, Hadol.

No. 263 Ovate hand axe,[49] neat, regular, wavy edge around, well flaked all over on both surfaces, partly by "step" technique, no cortex but a semi-circular slice cut off at the butt-end from the upper surface.

No. 261 U-shaped cleaver on thick flake (?)[50], underside, smooth, flat, flaked surface; upper rather roughly flaked towards the butt-end leaving pebble cortex on the rim, but its lower half has a steep smooth slope, with a straight edge.

No. 264a Rectangular piece, broader and rounded at one end, narrower with a straight edge on the other; smooth flat undersurface, much rolled, and probably a natural piece.

No. 265 Discoid, slightly rolled; steeply flaked all round with a wavy, now blunt edge, leaving a broad flat platform on top, and thick flat pebble cortex at butt-end.

No. 269 Discoid[51], slightly rolled; flaked all over, partly by "step" technique on both sides, with a protruding front and faceted butt-end.

No. 270 Half of a flat-bottomed oval pebble, split breadthwise; the split surface seems to be slightly chipped.

No. 271 Similar to No. 270, but larger.

No. 273 An ovally pebble, fractured at one end; rolled, natural specimen.

No. 262 Large U-shaped thick flake; the sides are slightly chipped or fractured at places, perhaps an used natural piece.

No. 275 A small chip.

No. 267 Polysided flake[52], slightly rolled and fully encrusted; underside primary flaked surface, with a small bulb (?) and faceted platform and fine convergent flake scars on face, intersecting with the underside and giving a sharp edge.

No. 279 Discoid-like flake; slightly rolled; underside as in No. 267, upper flaked all over with a deep cut on one side; the rest has convergent scars.

No. 268 Long, blade-like flake; flat, flaked underside; part of upper has cortex, no signs of subsequent flaking.

No. 280 Semi-circular flake; slightly worn; primary flaked underside; upper has large convergent flake scars.

No. 277 A thick triangular flake with worn surface; undersurface has a steeply sloping side.

No. 278 Nondescript piece, perhaps natural.

Chief features of the finds from the Junction of Gravel and Granite

On grounds of technique etc. the finds may be divided into:—

(a) Specimens with irregular outline, crude flaking. In this group would fall the pebble tools 270, 271; hand axe 264; core 265; and flakes 277, 278.

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49 See Pls. XI, (1) and XXIII (5).

50 See Pls. XI (3) and XXIII (7–8).

51 See Pls. XI (8).

52 See Pls. XI (5) and XX (10)

(b) Specimens with neat, regular outline, and good flaking, with no pebble cortex or with a patch well placed. Here would come the hand axe 263; cleaver 261; discoid core 269 and flakes 267, 279, 268 and 280.

Of these the hand axe 263, and flake 267 are the finest.

Finds exposed on the Granite Surface

There is only one find No. 252, from this locality, Juna Nālā, which was found lying on the exposed granite surface. The gravel above is eroded, but it may very likely be from the superimposed gravel.

The specimen is a sub-triangular or rectangular hand axe;[53] slightly worn, has a flat flaked undersurface; upper surface has a central unflaked (?) flat platform, with almost perpendicularly flaked sides and butt-end and a steeply sloping front, ending in a point.

Gravel Surface

Only one find No. 260, fresh, though slightly encrusted; a conical discoid;[54] flaked underside, upper flaked around half the periphery, upwards from the flaked underside; sharp edge.

Finds from Gravel

These are divisible into:–

(A) Rolled:Nos. 254, 253.
(B) Fresh.

Typologically these include:

1 Hand axes: Sub-triangular, No. 253.
Small ovate on flake, No. 255.
2 Pebble Tools (?) Nos. 254, 274, 249 (?)
3 Thick Pebble Flakes (?) Nos. 248, 251, 257, 250, 256.
4 Flakes: Nos. 259, 258.

Detailed Description

Level	Locality and Number	General Nature
In gravel	No. 253	Rolled sub-triangular hand axe, upper surface has a broad, flat, sloping, triangular platform of cortex, one side of which is steeply flaked; other slightly; the front has a pointed sloping end; underside too much worn and cracked.
In gravel 20 feet below junction of loess.	No. 255	Small ovate hand axe on flake; primary flaked underside and platform on back; no subsequent chipping; upper has cortex all over.
	No. 254	Portion of a flat-bottomed pebble; upper surface has a crude, deeply flaked conical ridge; facets now blurred by rolling.

53 See Pl. XI (2)

54 Pl. XX (13).

Level	Locality and Number	General Nature
In gravel 14 feet above river bed	No. 274	Flat-bottomed oval pebble with its side slightly chipped off giving a sharp edge.
In gravel 20 feet below junction of loess.	No. 249	Portion of a flat-bottomed pebble, split lengthwise, no marks of subsequent chipping.
In gravel 10 feet below junction of loess.	No. 248	Horse-shoe shaped thick flake, with a broad straight edge; cortex on rim; primary flaked upper and undersurface, edge utilized (?)
In gravel 15 feet below loess.	No. 251	Similar to No. 248, but quadrant and sharp edged.
Do	No. 257	Similar to No. 251, but smaller and broken at one end.
In gravel 10 feet below loess junction.	No. 250	Similar to No. 251, semi-circular.
In gravel 20 feet below loess	No. 256	Rectangular flake, flat on three sides; one of them has cortex; the fourth has a sloping surface, with a sharp uneven edge; underside, primary flaked surface.
In gravel 15 feet below loess	No. 258	Rectangular flake, with a fan-shaped bevelled edge, cortex on butt-end; looks like an "end" scraper.
Do	No. 259	Rectangular, plano-convex; primary flaked undersurface with erased bulb; platform on back; upper surface with a low mid-ridge; front has a bevelled edge with convergent flake scars; a single small triangular scar at the butt-end. The flake has sinuous edge, perhaps due to use.

The tools from this stratum fall into:

(a) Specimens, mostly pebble tools and chips, which after natural or artificial breaking, have received no subsequent chipping.

(b) Specimens include the rolled hand axe, No. 253 and the Levallois-like flake, No. 259.

Chief features of Hadol Tools

Viewing all the tools from the two localities and all the strata at Hadol, the same mixture of "inferior" and "superior" quality of tools is seen from the finds of the two important strata; first the junction of gravel and granite, secondly, the gravel; the finds from the former being the more important, because better and more varied. The general features of these, viz., neat, regular outline and good "step" flaking (as indicated by the ovate hand axe, U-shaped cleaver, Levallois-like flake and discoid core) correspond with similar features of tools from the gravel at Pedhamli.

CHAPTER II

PART II

The Orsang Palaeolithic Industry

Bahadarpur

The expedition visited the area around Bahadarpur (73° 37′ and 22° 19′)[55] on the Orsang river in Central Gujarat, particularly with a view to exploring the microlithic sites on the Orsang and the Hiran rivers noted by Bruce Foote. At the same time the opportunity was seized for surveying the river banks, in search of palaeolithic finds; specially it was necessary to search for palaeo-ontological evidence, as, Foote had discovered a few fossil bones and seen an elephant's molar.[56]

Of course much time could not be spent here in the river-survey as the time for closing the work of the Expedition for the season was drawing near. But even a few days work yielded in all 37 finds, some of which are not only the best but unique specimens in the entire collection.

Almost all the finds were collected from the gravel bed. But unlike the similar bed in the Sabarmati this stratum is neither very high from the present water-level, nor is it well-cemented together.

The gravel bed is approximately 25 feet below the surface and about 25 feet (?) above the bed of the river. At Kundya Nala, near Bahadarpur, the section of the right bank of the river is as shown in Fig. 7.[57]

The gravel bed here is lateritized as also the underlying sand.

Finds from Bahadarpur

As already said above, the gravel is loose. The lateritized gravel is naturally reddish, while the other is dusty, light blue in patches. Though the majority of the finds were made in the gravel, on its top, the gravel being loose, one cannot be sure of the exact location of each find. This is also indicated by the state of finds. Unlike the Sabarmati specimens many of these finds are rolled and others weather-worn; very few are sharp and fresh. So, according to the condition of finds, they are divided into three groups.

Condition of Implements

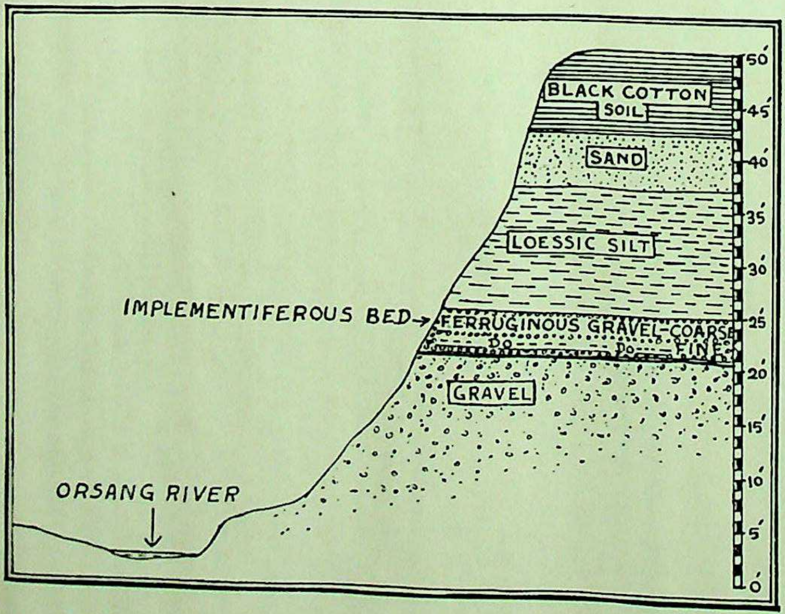
(A) Rolled : Flake scars practically effaced, making a smooth surface. Nos. 297, 298, 299, 301, 308, 310, 315, 316, 305, 303.

55 Survey map 1″ = 1 Mile, No. $\frac{46\ F}{12 \times 16}$

56 Foote, *GBS.*, p. 86.

57 Since the writer's camera did not work and the photos taken by the Official Photographer were somehow lost, it is not possible to illustrate this site.

Fig. 7.



Section of the right bank of the Orsang at Kundya Nala, Bahadarpur.

(B) Semi-rolled: Flake scars with their edges rounded by rolling, but scars still perceptible. Nos. 306, 286, 296, 285, 300, 290, 307, 291, 304, 311, 287, 288, 304, 289, 302.

(C) Fresh, or almost fresh: Flake scars clearly visible and edges fairly sharp. Nos. 295, 318, 294, 309, 313, 319, 320.

These also include two finds from the gravel-bed at Kherwa, on the left bank of the Orsang. Nos. 292, 293.

Most of the finds are of quartzite, one of trap and a few of quartz. Almost all of the first two kinds are rolled or laterite-stained or both, whereas only 2 or 3 of the quartz group are stained with laterite and rolled. This is probably because quartz is a much harder stone than quartzite.

The rolled specimens typologically include:--

1 Hand axes, sub-types:–
  (a) Small ovate on thick flakes, Nos. 297, 298, 308, 315.
  (b) Small, pear-shaped, No. 299.
  (c) Small, keeled on one face, No. 310.
  (d) Small, fan-shaped, No. 301.
2 Pebble Tool (?), No. 312.
3 Flakes, Nos. 303, 305, 316.

Detailed Description

Level	Number	General Nature
Gravel bed	No. 297	Small ovate hand axe; smooth flat undersurface; uneven upper surface, with trace of a deep flake scar(?) on one side.
,,	No. 298	Similar to No. 297; of trap; upper surface shows traces of scars.
,,	No. 308	Similar, with upper surface almost rounded.
,,	No. 315	Similar to 308; probably a natural piece.
,,	No. 299	Small, ovate, hand axe; battered wavy edge, and smoothened surfaces with traces of "step" flake scars.
,,	No. 310	Small hand axe, keeled on one face, heavily stained and rolled.
,,	No. 301	Fan-shaped hand axe; blunt, wavy, broad edge; heavily rolled and patinated.
,,	No. 312	Thick semi-circular pebble fracture, perhaps natural.
,,	No. 303	Small, semi-circular, flake, thick on arc side, surfaces completely smooth and flat; edge originally perhaps retouched.
,,	No. 305	Perhaps a natural fracture.
,,	No. 315	Disc-like flake; smooth primary flaked undersurface; upper conical; heavily rolled and stained by laterite.

No comment on the finds is possible except that the finds as a whole are small, and some of them retain traces of "step" scars.

(B) Semi-rolled Tools

1 Hand axes,
   (a) Broad ovate, Nos. 286, 296, 306.
   (b) Pointed ovate, No. 285.
   (c) Sub-triangular, Nos. 290, 300.
2 Pebble Tools (choppers ?), Nos. 291, 307, 314.
3 Discoid, No. 311.
4 Flakes, Nos. 287, 288, 289, 302, 304, 317.

Detailed Description

Level	Number	General Nature
Gravel bed	No. 306	Broad, ovate, hand axe, rolled and stained; both surfaces retain traces of flake scars, particularly the upper which at one end is deeply cut, making a thin, flat, platform.
"	No. 286	Similar to No. 306; underside flat, perhaps a flake surface, upper steeply slopes at one end.[58]
"	No. 296	Ovate hand axe, rolled and stained; underside flattish, but flaked around the edge by "step" technique; upper has a few large scars.[59]
"	No. 285	Small, pointed, ovate, hand axe; rolled, but one surface has a very deep broad "step" scar in the centre, and another at the edge.
"	No. 290	Small, triangular, hand axe; surfaces smooth owing to rolling, but edges retain traces of "step" scars.
"	No. 300	Small, lozenge-shaped, hand axe; symmetrical wavy edge; originally flaked all over on one surface, and partly on the other.[60]
"	No. 291	Small chopper, rolled and stained; its front half has a roughly flaked dull point, the other has rounded surface; underside has a similar front, but flat rear, with the butt-end obliquely cut off.[61]
"	No. 307	Chopper, quadrangular, flat-bottomed; conical face has a large flake scar on three sides, while the fourth is rounded and retains the original "cortex".
"	No. 314	Chopper or Scraper (?), thick triangular piece, rolled and deeply stained, has a broad edge as a result of intersection of steep flaked sides by "step" technique.

58 Pl. XXIII (16).
59 Pl. XXIII (17).
60 Pl. XI (11).
61 Pl. XI (12).

Level	Number	General Nature
Gravel bed	No. 311	Small discoid, rolled, lightly stained ; flattish surface (under) ; upper marked by steeply flaked sides, converging at a small flat platform in centre with the butt-end probably unflaked.
"	No. 288	Small, triangular, flake, broad point, low mid-ridge on face; undersurface as in No. 287.
"	No. 287	Small, oval, flake, primary flaked underside, upper flaked all over, partly by "step" technique.
"	No. 289	Heart-shaped flake; undersi de as in No. 287, upper flaked all over, making a ridge on one side and marked by a deep "step" scar; "cortex" on one side forming the point.[62]
"	No. 302	Small, rectangular flake, rolled but not stained; under surface as in No. 287, with striking platform on the butt-end, upper surface has a low ridge and two platforms.
"	No. 304	Square flake, pointed on one side, and steeply sloping on the opposite side; faces smooth owing to rolling.
"	No. 317	Ovate piece, underside flat, but has a rather deep scar; the upper is flaked principally along the border with a flat platform in the centre.

Features of tools in (B).

Technically these semi-rolled finds may be divided into "early" or "inferior" and "late" or "superior" series.

Thus we have in

(a) Tools with irregular outline, large roughly flaked scars, viz. the following:–
Hand axes, Nos. 286, 296, 285, 290.
Choppers, Nos 291, 307.
Flake, No. 311.

(b) Tools with rather symmetrical, regular outline, and well flaked surfaces: These comprise the following:–
Hand axe : No. 300.
Chopper : No. 314.
Discoid : No. 311.
Flakes : All, except No. 317, which seems to be Early Levalloisian-type.

(C) FRESH TOOLS

1 Hand axes, sub-types:–
(a) Pointed ovate, No. 295.
(b) Pear-shaped from Kherwa, No. 292.

2 Chopper, Nos. 294, 318.

3 Discoid (?), No. 319

4 Flakes,
(a) Blade (?) : No. 309.
(b) Ordinary : No. 320, 313, 293

62 See pl. XI (15).

Detailed Description Level	Number	General Nature
Gravel bed	No. 295	Pointed ovate hand axe, fresh and unstained, sharp wavy edge around except at the butt-end; flaked all over, so well that the surface appears smooth, but for minute "step" scars; the point is broken or truncated.[63]
,,	No. 292	Pear-shaped hand axe-on-flake, stained; underside primary flaked surface; upper slightly flaked along the border on lower part of the sides.
,,	No. 294	Ovate chopper or hand axe (?), wavy edge; not much flaked.
,,	No. 318	Chopper, flat-bottomed; upper bears large flake scars.
,,	No. 319	Ovate, conical with rounded butt-end, flat, flaked under surface; perhaps a natural piece.
,,	No. 309	Long rectangular, two-edged blade; underside primary flaked surface, rather concave and not flat, with a possible bulb with striking platform at one end; the upper has a long parallel flake scar in the centre, with steeply sloping sides; edges dull and sinuous owing to use or battering (?)[64]
,,	No. 320	Long, thick rectangular flake; smooth, flat underside with a large "step" (?) scar; upper has a curved mid-ridge, one side of which is flaked.
,,	No. 313:	Rectangular flake, perhaps natural.
,,	No. 293	Crescentic flake, underside primary flaked surface; upper flaked only in half, marked by three large scars.

These few finds fall into two series (a) and (b) as before. In (b) we have the fine hand axe, No. 295 and the flake, No. 309; all the rest belong to series (a).

Features of the Orsang Industry

The chief features of the Orsang industry are that unlike the Sabarmati it comprises tools of quartz, quartzite and trap, the two latter of which are much rolled and stained with laterite. But as in the Sabarmati the old Orsang gravel bed has given a mixed type of industry, crude and fine, comprising hand axes, choppers, discoids and flakes. In both "step" flaking seems to be common, but it is much neater in the fine variety, so much so that its one specimen, No. 295 may be considered finer than many similar Sabarmati hand axes, because the material in which it is worked—quartz—is more intractable than quartzite. The same is true of the flake-blade, No. 309.

63 See Pls. XI (9–10) and XXIII (18).

64 See Pls. XI (13–14) and XXIII (19).

CHAPTER III

THE EXPLORATION OF MICROLITHIC SITES

PART I

SURFACE EXPLORATION

From the sites previously visited by FOOTE or newly discovered by the Expedition numerous microliths were collected. Of these the finds included in the Report were selected on the undermentioned principles after a careful scrutiny.

Principles o selection and classification

(1) In cores, only those specimens have been selected which are neatly or crudely trimmed, and show at least one or two distinct flake scars.

They are further sub-divided into groups according to their shapes.

(2) In selecting flakes, attention is first paid to the nature and place of the working edge in a given specimen.

While classifying these flakes into different types—blades, scrapers, etc., the position and nature of the working edge was the prime consideration and then the shape of a given specimen. Accordingly specimens with edge on both sides and rectangular or linear in shape have been called,

(A) Rectangular blades: further sub-divided into:–
 (a) Long and pointed.
 (b) Thick and flattish,
 (c) Thin and flattish, with a parallel flake scar on their upper surface (or face).

(B) Crescent blades: these are primarily one-edged, the other or the backside being made purposely blunt. These are further subdivided into:–
 (a) Segment of circle or pure crescent: convex worked-back, and chord-like straight edge.
 (b) Triangular-crescent: the back is actually convex or at times really angular.
 (c) Quadrantal or half-crescent, like a right-angled triangle with the hypotenuse slightly curved.
 (d) Semi-circular, with a flat, thin body.

(C) Scrapers: these are mostly thin, flat pieces, with one side more sloping than the rest and edged. These are sub-divided into :–
 (a) Circular or disc-like (large).
 (b) Button(?)-like, (core trimming?), slightly pyramidal (small).
 (c) Irregularly shaped.

(D) Points: A few pieces, from their shape and number, seem to be purposely so made; that is, they have got
 (a) a thick triangular body and are sharply pointed.
 (b) a thin triangular body and are sharpely pointed.

Such specimens are called 'points'. They might have been used as drills, needles, gravers and served the purpose of a piercer. They are rather crude, and few have got a burin facet.

Surface Microliths from Kashadio Ṭimbo, Hirpura

Hirpura[1] is situated at a distance of about 4 miles to the north-east of Vijapur. Here, just where the cart-track from Vijapur turns northwards and marks a junction with that coming from Dhanpura, a very low small loess mound, called locally "Kāshedio Ṭimbo" was noticed. It cannot be more than 6 feet in height from the surrounding plain and about 325 feet from north to south and about 300 feet from east to west. Adjoining, but separated by the cart-track to Dhanpura, is another mound about 300 feet by 115 feet. As we were proceeding to Hirpura village, we noticed at the north-western corner of the Kashedio Ṭimbo big rat holes in the earth. At the mouth of one of these holes a chert flake was found. This led to the examination of the entire mound, and within a couple of hours a large collection was made. It was observed while collecting that of all the places on the mound, the first site, viz. the north-western corner yielded the largest number of finds. Hence it was later excavated.[2]

Classes and characteristics of important Finds

Out of the 93 selected finds
Nos. 1–15, 15a–d are classed as Cores.[2a]
Nos. 16–24a, 27,29,33-37, 54,- (54–57)? „ „ „ Blades.[2b]
Nos. 25, 26, 28, 30–32, 38–45, 47–54, 57?–75 „ „ „ Scrapers.[2c]
Nos. 46, 76, 77b, 78–93 „ „ „ Points.[2d]

The above classification is based on the principles mentioned above. There are cases, however, where it is difficult to say exactly whether a specimen called "core", was only a core, or also a scraper, or a blade was that alone, or also a scraper, or a point.

Among the so-called cores, there are 6 of quartz. All of these show unmistakable signs of flaking, but the good specimens are Nos. 2-3 and 5; of these No. 3 is the best, showing as it does, first the preparation of the base, from which flakes have been removed upwards by "step" technique.

The rest are of chert. Most of these are crudely flaked but the technique employed must either be "step" or "pressure" or in some cases both. This is clearly illustrated by Nos. 8,11,15a, 15c, 15d. No. 11 is a good specimen of a core with convergent flake scars. No. 12 may be a core-scraper having a bevelled, roughly chipped edge.

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1 Survey Sheet 1″=1 Mile, No. $46\frac{A}{10 \times 24}$.

2 See Chapter III, Part II.

2a See Pls. XIII (6, 7, 8, 12) and XXV (10, 11).

2b See Pls. XIV (1, 11, 16, 21), XXVII (9, 18, 20) and XXVIII (10, 13).

2c See Pls. XV (5, 10, 21, 22) and XXVI (8, 9, 13).

2d See Pls. XV (13) and XXV (19).

The general characteristics of blades have been indicated above; their exact shape etc. have been described in detail in the Catalogue. Among rectangular blades, the specimens deserving notice are Nos. 22, 23a, 24a. No. 22 seems to combine in itself the qualities of a blade and also a graver (or burin). For it appears that it had a point made by holding the flake vertically[3], the sharp tip of which is now broken. No. 22a has a neatly flaked parallel scar on its ridged surface and sharp side-edges. The technique employed here is also found in No. 26. No. 24a is a good specimen of Levallois-like flake, having a smooth under surface with a bulb of percussion, and striking platform, whereas the upper surface has a sharp uneven edge on a gently sloping side.

Among crescents No. 37 may be mentioned; it has a fine shallow concave edge, and a thick battered or worked-back. Similar is a triangular variety of it, No. 45.

Among scrapers, the following are good: Nos. 42b, 61, 62, 63, 68a, 69–72. Of these the finest is No. 68a, with a minutely trimmed, sub-conical surface, and a sharp edge all round. The purpose of such small but well worked pieces as Nos. 68, 71, 72 is difficult to ascertain. They might be "core–trimmings," as they resemble specimens illustrated by CLARK.[4] They might as well be "strike–a–lights." Still smaller and finer specimens were met with in excavated finds.

The so-called "points" are all very crudely flaked specimens, excepting No. 78. It is triangular, has a thick body, with one half of its upper surface marked by clean parallel flake scars; the other half has a steep sloping surface and a sharp edge.

If these 'points' are indeed purposely made, then it must be said that these are very poor specimens of the type. None of these approximates to an arrow-head.

SURFACE MICROLITHS FROM GHADHARA (GADHADA) I

This plateau lies at a distance of 2 miles to the north-east of Hirpura village, on the right bank of the Sabarmati. FOOTE[5] had also collected over 50 microliths from the top of this "200 feet loess plateau." In the three hours we were there, we made a large collection, out of which over 100 were selected for inclusion in this Report. Of these[5a]

Nos.	104–119	are grouped as Cores.
Nos.	120–177E	,, ,, ,, Blades.
Nos.	178–210W	,, ,, ,, Scrapers.
Nos.	211–225K	,, ,, ,, Points.

None of the cores is of quartz. But the variety among chert is great, including one very rare specimen No. 117 of lydium. Almost all, except No. 119, have been roughly flaked. No. 119 is not only well-flaked, showing several, parallel flake scars, but unlike the rest, it is not round, but long, in a vertical section, thick and rounded at the base, becoming curvilinear on the top.

3 Cf. BURKITT, *The Old Stone Age*, (Cambridge, 1933), p. 59.
4 CLARK, *The Mesolithic Age in Britain*, (Cambridge, 1932).
5 *Catalogue Raisonne*, p. 207; *Notes on Antiquities*, p. 142.
5a See Pls. XIII (3, 4, 5, 10) and XXV (12); Pls. XIII (13) and XXVIII (12); Pls. XV (1, 4, 6) and XV (11, 12, 15, 16), and Pl. XXV (18) respectively.

There is a large number of blades. Some of these, Nos. 156–161, might be included in the group of scrapers. As far as their size is concerned it seems that we have here the largest number of big-sized blades in the entire collection, the biggest of the whole group being No. 120. It is about 3 inches in length and a little less than three fourths of an inch in its maximum width. Centrally ridged, with clean, well-flaked sloping sides, sharp edges, a bevelled point, and primary flaked undersurface, it is a fine specimen of a levellois-type flake. From its size it can scarcely be called a microlith.

The sub-group of rectangular or semi-ovoid blades embodies the characteristics of blade No. 120. But there are two, Nos. 126 and 127, also No. 121, which have a broad sloping cutting-edge, like that of a chisel.

The second sub-group consists of smaller and narrower blades, some of which are crescentic, with a worked or battered back. One of the most delicate of these blades is No. 138,[6] with a curved, nicely trimmed body and sharp edges. No. 158, a larger-sized specimen deserves mention because of its sickle-like curved point, and the deeply notched or hollowed side.

Among scrapers there are several with sharp scraping edges (Nos. 183, 184, 186 etc.), but there is one, No. 180 which resembles a true "side-scraper" with its bevelled, secondarily chipped side. No. 198 is a beautiful specimen of the convergent and No. 201 of parallel flaking.

In "points" there are some which might have been accidentally so made, but specimens like Nos. 212, 214, 215, 216, 219, 221, 222, 224, 225b leave no doubt that they were deliberately so made. The finest no doubt are No. 212 which has a gouge-like point, and No. 216 with its sickle-like serrated and curved point. No. 225E is indeed a tiny curved knife.

No. 225K was found in a pocket in the inner side of the plateau. Undoubtedly it is polished like a neolith. But what could be its use ? Was it a kind of rubber of paints etc.?

SURFACE MICROLITHS FROM GHADHARA II

A small collection was made from loess mounds lying in the interior. Of these

Nos. 226–253A are grouped as Cores.
Nos. 234–251 „ „ „ Blades.
Nos. 252–264A „ „ „ Scrapers.
Nos. 265–268, 269, 270 „ „ Points.

The cores are comparatively much smaller than those described previously. A few of them are of quartz. Though small, these cores exhibit two new characteristics. Some of them, though roughly flaked, achieve an edge as in pebble tools, keeping the other half flat or roundish with its original cortex. Others show well-faceted sides. While one solitary piece, No. 232, in its flaking and shape resembles No. 119 of the Ghadhara plateau.

The blades too are smaller. One or two of them deserve notice. No. 247 with its curved edge and hook-like pointed end, looks very much like a sickle. No. 249 has a well-worked back and face, and delicately trimmed 'fine' point.

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6 It is similar to one from Maski (Hyderabad State) in the Museum of the Deccan College Research Institute.

Among scrapers there are three which are perhaps the finest in the entire collection. These are Nos. 264, 264A, 264B. All of these have got a thick body, flaked upper or undersurface or both, and bevelled edge on one side, showing clear signs of secondary chipping. No. 264 besides has a tang-like projection, which suggests that it was probably meant for hafting.

There are very few specimens of points. Two of these, Nos. 264C and 267, with the end opposite to the pointed end sloping and narrowed, could be hafted and used as arrow-heads, etc.

Surface Microliths from the small loamy Hillocks on either side of the Sabarmati between Pedhamli and Rampur

A small collection of microliths was made while going along the Sabarmati from Pedhamli to Rampur[8], and while examining the opposite bank of Karoli–Pedhamli. In order to distinguish the finds from different localities, the collection from each locality bears its abbreviated name. But as all the finds were not made at one particular spot in these localities, as at Hirpura or Ghadhara plateau, for discussing their general characteristics, the whole group is taken.

The collection is remarkable for two things: first for the number of large-sized finds; secondly for the number of small and large quartz and quartzite specimens. One may wonder whether they are at all microlithic; or do they in fact belong to late palaeolithic times? Since they are finds from the surface of loess and not even from the surface of the river-bed, there is no evidence to regard them as palaeolithic. It is possible they were palaeolithic in origin and later brought up. However, it may be said for their microlithic character that excavations have shown that the man of this period did use quartzite; and since this material was available in large pebbles naturally his tools were also large-sized, though comparatively cruder in make. A few of the quartz tools compare favourably with the quartz palaeoliths from Bahadarpur. The finds when classified fall into:—

Cores: Nos. 271–275, 312.

Blades: Nos. 276–282, 301, 313, 314, 316–317, 319.

Scrapers: Nos. 284–291, 298–299, 304–305, 307, 309, 310, 311, 315, 331, 333–338, 340–346.

Points: Nos. 292, 294–99, 308, 320–29, 332, 347.

Of the few cores Nos. 274 and 275 are of quartz. The purpose of one of these, No. 274, an oval piece with a thick trimmed border, is not clear. So also of No. 271. The remaining pieces have got a sharp, sloping edge, and hence may be approximately called scrapers.

In blades two finds, No. 301 of vein quartz and No. 313[9] of quartzite stand out by their size and nature of the material. They are fine specimens of Levellois-type flakes. While such specimens are rare among microliths, there

8 Survey Sheet 1″=1 mile, No. 46 A. 10 × 14. For longitude and latitude see *above* p. 20.

9 See Pls. XIII (15, 16) and XXVIII (1).

are none too common in the palaeoliths. Leaving aside the question of size, other specimens in this collection show that microlithic man did use quartzite. We have no less than 5 specimens, Nos. 286, 289–292, all from the right bank at Pedhamli. The purpose of three of them, all thick with trimmed borders is not apparent. But No. 285 is a definite attempt to prepare a point or a blade, but owing to the coarseness of the material the specimen appears rough with no sharpness about it.

Four scrapers deserve notice. Two of these, Nos. 311 and 313, are of quartzite; one, No. 330[10]. of vein quartz, and the fourth No. 315 of chert. No. 311[11] is not only large, but has a curious upturned edge resulting from the intersection of the sloping upper surface and the undersurface flaked off upwards. No. 313 has been already noticed above. It appears that it served both as a blade, and as an end-scraper.

No. 315 is a large-sized thin flake, having one end convex and the other angular; one of the sides and the angular end seem to be flaked, and have the semblance of an edge. No. 315 is a tiny sample of an end-scraper.

One specimen among points is peculiar. It is No. 322. Though it has not got a very sharp point, the thick flattish butt-end, slightly notched in on either side, suggests that the specimen was very likely hafted.

Loess hillocks in the interior

After finishing the survey of the Sabarmati and the exploration of microlithic sites on or adjacent to the river in the Vijapur Mahal, our next objectives were the loess hillocks in the interior. Foote had noticed Mulsan and Dangarwa. Some of these sites are situated around loess hillock-girt inundation lakes; a position which can be appreciated when one remembers the proximity of water and the existence of game birds as two of the conditions for the survival of Early Man and his successors.

These hillocks and sites are within Kadi and Mehsana Mahals of the Baroda State and approximately 20 miles away to the west of the Sabarmati.

Langhnaj

Langhnaj (72°·32′ and 23°·27′)[12], a village in the Mehsana Mahal appeared to be a convenient place from which the exploration could be carried on. It is a station on the Vijapur-Ambliyasan branch of the Gaekwad's Baroda State Railway, about 16 miles to the south-west of Vijapur and 8 miles to the east of Ambliyasan, and about 13 miles to the south-east of Mehsana, the chief town of the Prant.

Surface Microliths from Mulsan

Mulsan (72°·32′ and 23°·31′)[13] is situated about 7 miles north-west from Langhnaj. Here there are a number of loess hillocks. Since Foote had not

10 See Pls. XIII (14) and XXVI (6).
11 See Pl. XIII (1).
12 Survey Sheet 1″=1 mile, 46 A/11 × 15.
13 „ „ „ „ , 46 A/10 × 14

specified the hill from where he had made his collection,[14] our party was split up into two, one party explored the hills to the east of the village, the other to its west. It appears that FOOTE had found microliths on the hill, which is locally known as Ram Pir-*no* Ṭimbo (mound), because it was here alone that we could get a few micros. The hill is to the east of the village and about 50 feet in height. The microliths were scattered over a small area near the top.

In the collection there are very few large specimens, most of them being small or tiny finds, some of them of quartz. It is possible that these tiny bits are rejects. There are no cores. Among blades there is one, No. 369[15], which both from the point of view of colour, material and workmanship is a rare specimen. It is a crescentic flake of green stone having a worked angular back, small, steeply sloping, sharp side edge and tapering at one end into a curved point; the underside has a smooth surface, with a bulb of percussion.

Among points No. 360, a small triangular or convex polygonal piece of quartz, and the other No. 379, a pear-shaped piece of white, shining quartz are good specimens.

SURFACE MICROLITHS FROM AKHAJ

Akhaj (72°·31′ and 23°·28′)[16] is about 4 miles to the north-west of Langhnaj. While going to Mulsan we noticed that this village had small loess hillocks to its north, south-east and south-west, whereas there was a small lake at the foot of the hillocks to the south-west. Thus it seemed to be a promising microlithic site. We, therefore, decided to explore its surroundings on the following day. The party which examined the hillocks on the south-west and to north was well rewarded; the other hillocks yielded mostly quartz specimens.

These localities have been accordingly called A1, A2, A3. From the locality A1 a mound to the south-west of the village, a number of finds were obtained.

Two of them may be cores, but there is nothing to note about them. There is no good blade either. From among the scrapers, No. 402, with its U-shaped base, and a sharp, sinuous long arm and the undersurface having a pronounced bulb is notable.

Of the points, No. 424[17], a triangular piece with rounded base, and small sloping sides ending in a sharp point, and flat face, seems definitely a good specimen of an arrow-head. No. 426 is of quartzite, and has its point broken; but its peculiarity lies in its sloping wedge-shaped back. Have we here a specimen which was perhaps hafted?

With regard to the material most of the pieces from A2 (north) and A3 (south) of the village are of quartz. From A1 comes No. 410, a piece of bronze or copper arrow-head-like pointed weapon, raising many important issues, if indeed it is of the microlithic period.

14 Foote, *Catalogue*, Nos. 3204–3232. pp. 205–06; *Notes on Distribution*, p. 141.
15 See Pls. XIV (13) and XXVII (10), where by mistake it is called 367.
16 Survey sheet 1″=1 mile, No. 46 A/11 × 15.
17 See Pls. XV (17) and XXV (17).

Surface Microliths from Langhnaj

Though our chief object was the microlithic site at Mulsan, our explorations revealed that Langhnaj itself was by far the most promising site in the area. It has several loess mounds. The Rest-house stands on a mound which is now cut into two by the road going from the station to the village. Another mound is across the pond of water, and the third is by the side of the last. Thus the first mound is situated to the north of the village, the second to its north-east and the third to its north north-east, the depression between them forming the pond.

The first mound is here called Mound LI. Its maximum height might be 50 feet from the surface of the pond, and about 30 feet from the road. Of its two sides, the left hand side—that sloping towards the lake—yielded a large number of finds.

The other mound is called Mound L.II. It is across a small "inundation" lake, at a distance of about 4 furlongs from the first. It rises up gradually to a height of 50 or more feet. It is not one mound but is made up of two or three smaller ones.[17a] The largest and the best collection was made, however, on the top and the deeply cut sides of the principal mound.

The Langhnaj collection, though large, has few cores worth noticing. No. 483[18] seems to be, when whole, like No. 119 from the Ghadhara plateau. Now it has 3 fine flake scars on one side only. No. 489 is worth noticing, not because of its flaking, but because of the pleasing effect its dark-brown and red colour produces.

Among the many blades there are very few of the long, rectangular, two-edged type. Even out of these few, a number of them seem to be broken. There is a large number of worked-back crescents or lunates,[19] which may be further subdivided into (i) medium, (ii) small and (iii) very small. Two, Nos. 466 and No. 534, both of jasper, deserve notice. No. 466 has a very fine sharp point and straight edge; No. 534 has a polished undersurface and side, and well-trimmed back. Nos. 552 and 557 from the small and very small class respectively correspond to these.

There is no good scraper. No. 569, from the manner in which it is flaked, seems to suggest that a good scraper was in the making.

Among points, No. 547 with its sharp, curved point, like a feline claw or tooth, strikes our attention.

Besides these, the three "rubbers" or "polishers" are of interest. No. 475, triangular, flat-sided, with one side smooth and polished is similar to one, No. 225K, found from the Ghadhara plateau. No. 476 seems to have served a similar purpose, though it is merely a part of a pebble. No. 471 is much larger, elliptical in shape and has a bevelled edge. Its surface is very coarse, nonetheless it seems to be a rubbing stone, perhaps for preliminary work.

17a The Survey Map (*Ibid*) will show their 'M' shaped contours.

18 See Pl. XIII (9).

19 See Pls. XIV (24, 32, 27 respectively) and XXVII (2, 6, 10, 14).

Two fossilized, one partly calcined, pieces of bone have also been included in the collection. They show that such fossilized bones need not be necessarily surface (and hence later) things. Exactly similar bones were found from the excavation showing that the surface finds were the washed out relics of an earlier date.

With regard to the material, it may be mentioned that quartzite was also used, though sparingly.

SURFACE MICROLITHS FROM VERAI–MATA–*no*–ṬIMBO

During our stay at Langhnaj, information was brought to us that microliths were available in its vicinity. One such site was the mound, called Verai–Mata–*no*–Ṭimbo, between the village of Ranchhodpur and Jornang[20] to the west south-west of Langhnaj. The exploration Jamadar was sent to the site, along with a local guide. From their collection 23 pieces have been selected.

In this collection, Nos. 572–95, bearing the abbreviation MM, there are no cores. There are a few small "worked-back" and two-edged blades, among which No. 582,[21] and No. 586 are the finest. No. 591 seems to be a chisel-like variety of a blade having a two-faced thick back, and sloping sharp-edged side.

No. 587 has a well trimmed face, and looks like a side-scraper, whereas in No. 589, it appears, we have a hollow scraper.

Of the three points, two—Nos. 592 and 593—are indeed fine. No. 592[22] is slightly broad-based, and has a low mid-ridge, which ends in a sharp point.

SURFACE MICROLITHS FROM BAMANIYA ṬIMBO, JUNI SHEDHAL (SHERAVI)

Juni Shedhal is about 2½ miles to the north-west from Dangarwa. A small collection was made from a mound there called Bamaniya Ṭimbo, the finds however bear the abbreviation JS. It is notable for its small—very small—two-edged blades, Nos. 596–99. These tiny blades distinctly reveal that they were so made, and not mere chips.

SURFACE MICROLITHS FROM DANGARWA

Dangarwa (72°·29′ and 23°·23′)[23] is a railway station on the B. B. & C. I. Railway running from Ahmedabad to Delhi. It is comprised within the Kadi Mahal, Mehsana Prant of the Baroda State. Though FOOTE had made a very small collection[24] from the top of the loess hill, south of the village, the reason for selecting it was that FOOTE had elsewhere[25] suggested that the area was full

20 72°·29′ abd 23°·27′. Survey Map No. 46/A–3 × 7.

21 See Pl. XIV (5).

22 See Pl. XV (19).

23 Survey Sheet 1″=1 mile, 46 No. $\frac{A}{3 \times 7}$.

24 *Catalogue Raisonne*, p. 204; *Notes on Ages*, p. 141.

25 *GBS.*, SHAH, *op. cit.*, p. 2 and 70.

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of loess hills. We decided to explore a few of them, and so visited Dangarwa and other places from our base camp at Kalol. There are a number of small mounds in and around the place. But none of them proved to be very promising. Only from one mound called Rabārino-Ṭimbo situated to the south-west of the village did we get a few finds, mostly of quartz. Two of them are cores, the rest flakes; of the latter No. 635 seems to be a scraper; No. 642 is perhaps a tiny chip of a two-edged blade.

Surface Microliths from Waru (Wadu) and Kiol (Kiyal)

Waru (72°·33′ and 23°·22′)[26] is a small hamlet, situated at a distance of 3 miles to the south-east of Dangarwa. Here is a small hillock of loess, called locally 'Kodivalo Ṭimbo'. A small collection was made from this site, from which a few cores, blades, scrapers and points were found worth including in the Report.

Among the fifteen (Nos. 607–622) finds, almost half are of quartz; in the rest, excepting one of quartzite, all are of chert. All the quartz specimens are small. Of these No. 617 small and crescentic with a sharp curved point reminds us of a similar feline claw or toothlike specimen (No. 547) from Langhnaj. No. 622 bears a definite mark of 'step' flaking. Others are crude specimens, some of them perhaps chips, but included here, because they show marks of flaking.

The village of Kiol (72°·29 and 23′.24′)[27] lies at a distance of 2 miles to the north west of Dangarwa. We approached the loess mound from the railway line. From the mound we could see a small lake on the other side. It appears that this is also another loess hillock-girt lake, similar to that at Akhaj, Langhnaj and other places. Unlike other mounds so far inspected by us, this mound is heavily wooded, mostly by brushwood, babul and other trees. Consequently very few finds came within our view. But among these few specimens there is one, No. 628, a pointed oval, the front half of which is beautifully flaked into a sharp point;[28] the back half, marked by a rather deep flake scar which definitely must have served as a pointed tool or weapon. No similar specimen was found elsewhere.

Surface Microliths from Hadol and its Vicinity

The situation of Hadol has been described previously.[28a] Though the country in and around is rocky, a few loess deposits, rising into small mounds are found here and there. One such lies a little to the north, on the right hand side of the road to Juni (old) Hadol, a few furlongs from the village school-cum-post office. This mound yielded a very small collection of quartz pieces, out of which four have been included here. Of these No. 645 is rather a crude specimen of a crescentic "worked-back" variety of blades.

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26 Survey Sheet 1″ = 1 mile, No. 46 A/11x15.
27 " " " " , No. 46 A/3x7.
28 See Pl. XV (20).
28a See *above*, p. 2.

SURFACE MICROLITHS FROM RANGPARA

Really important sites are situated to the south and south-west of Hadol, as indeed they should, for the loess country lies in that direction. Here, from a mound near the village of Rangpara (72°·48′ and 23°·56′),[29] about 4 miles to the south-west of Hadol, a small collection was made, mostly of quartz pieces. Ten of these are included in the Report. Of these, the one and the only core No. 649, a long rectangular specimen, is similar to No. 119 from Ghadhara having unmistakable flake scars on its face. No. 657, an U-shaped piece, has a well flaked face, and rounded sides, but has a definite edge, so its use is doubtful. No. 658 and 659 have a well trimmed face, which is rather rare in quartz. No. 658 seems to be broken from the back, but its bevelled edge suggests that it might be a scraper.

The mounds between Vetapur (really Otalpur)[30] and Rangpara, to the south-west of Hadol, yielded a small but fine collection of quartz cores, blades, long, two-edged, and crescentic worked-back–scraper, button-like pieces, and points.

From amongst the cores, No. 660, from the blades, No. 667 and No. 676, from the scrapers or button-like pieces, No. 665 and No. 666 and point No. 678 deserve notice. No. 667[31] shows that even in a hard rock like quartz fineness can be acquired, though a very sharp edge is not possible. It has a smooth plano-convex face marked by a shallow flake scar; while the underside has a fine bulb of percussion. Similarly No. 676[32], though half broken, has a good worked-back, and fairly sharp edge.

SURFACE MICROLITHS FROM KANERIA

Kaneria [33] (72°·48′ and 23°·55′) is about 3 miles south-west from Hadol The mounds here yielded a small number of finds. The first appears to be situated to the west of the village. Of its four selected finds, No. 681 is a small, broken, but a good specimen of a core; No. 683 is a specimen of a well-flaked plano-convex, part of a two-edged blade.

From the second mound lying to the south-west of Kaneria, were obtained a large, well flaked, quartzite discoid, core-scraper (No. 685), and a small number of quartz pieces, among which a scraper-like piece, No. 639 has a distinct "step-scar" on one face, and a parallel flake scar on the other, and a chisel-like straight edge. No. 691 is a good sample of a broad two-edged plano-convex flake, and Nos. 693 and 695 thin and narrow specimens of such blades.

SURFACE MICROLITHS FROM MALIPARA

Malipara (72°·50′ and 23°·55′)[34] is about a mile south-west of Kaneria. The map shows two mounds to the north of the village. One of these yielded a

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29 Survey map 1″= 1 mile, No. 46 A/9 x 13.
30 *Ibid.*
31 See Pl. XV (7).
32 See Pl. XIV (30).
33 Survey Sheet, 1″=1 mile, No. 46 A/9 x 13.
34 *Ibid.*

small series of mostly quartz finds. Among the non-quartz specimens, there is a very fine rectangular core-scraper, No. 697; it is flaked over on both sides, but has on one side neat parallel flake scars, and sharp bevelled edge on the adjoining side[35]. The small quartz cores, Nos. 699 and 700 are also well faceted. But the finest is a medium-sized almond-shaped piece, like a miniature hand axe. It is slightly thick at the butt, thin and flat at the point, with sharp sides. Nos. 711 and 712 are two specimens of a worked-back blade, the former being of chert.

Surface microliths from Dharawania

Dhārāwānia (72° ·50′ and 23° ·56′)[36] is a small village about 2 miles to the south-west of Hadol. Two of its very small collection are notable for their material, viz. light grey quartz, resembling amethyst. Of these No. 718 is a small core-like piece, Nos. 722-23 tiny pieces of a two-edged blade.

Surface Microliths from Vasad and Jalampura

Vasad is situated on the bank of the Mahi in Central Gujarat. It is a station on the B. B. & C. I. Railway and about 15 miles from Baroda. We had to pass through it on our way to Jalampura, where Foote had found a human cranium.

There along the ploughed field microlith-like pieces of quartz and chalcedony were noticed; hence a small collection was made. But even out of the selected specimens included in this report many seem to be naturally fractured, or split pebbles. A few of the agate cores, Nos. 736–740, have got parallel flake scars on one side, the rest having cortex surface. But sometimes agate does flake off like this naturally.

However, there are two quartz pieces Nos. 731 and 744, which appear to be genuine, the finer being No. 744, a pointed ovoid, having a well flaked face, sharp sides and a point.

Surface Microliths from Jalampura

Jalampura (73°·5′ and 22°·8′) is on the right bank of the Mahi, about 14 miles to the north of Baroda. Here the finds were made on the loess surface cut by *kotars* of gullies.

Split pebbles, perhaps later retouched, also are a characteristic of this collection. But in it too there are two pieces, Nos. 754 and 735, one large, and the other small of two-edged, ridged quartz blades.

Surface Microliths from Bahadarpur and its Vicinity

Bahadarpur (73°·37′and 22°·11′)[37] is situated on the right bank of the Orsang in Sankheda Mahal. On the opposite bank is Sankheda, the chief town of the Mahal.

35 See Pl. XXV (5·6).
36 See Footnote Nos. 33.
37 Survey Sheet 1″ = 1 mile. No. 46, F.12.

FOOTE had collected his specimens, a large number "under the tree at the north-west corner of the fine tamarind top forming the camping ground north of the town."[38] Unfortunately when we visited the site, it had changed considerably. Cotton presses and godowns had sprung up and there was no trace of the tree mentioned by FOOTE. We, therefore, examined the gullies and small hillocks of loess along the bank of the river, and were rewarded with, compared with FOOTE's, a very poor collection. It contains no real core, or a specimen of a two-edged blade or a good worked-back blade or scraper.

Almost similar is the case with the small collection from Wadeli (73°·40′ and 12°·18′) lying on the left bank of the Orsang, about 7 miles north-east of Bahadarpur. However there are two pieces, one of quartz, No. 779 and the other No. 778, a green piece of plasma which are noteworthy. The latter has a fine worked-back, sharp edge on one side, and a sharp point. The former has well flaked sloping sides with sharp edges.

FOOTE also mentions a piece of bronze bangle and two or three terracotta objects which he found at a little distance below the village.[39] We did not come across such finds, but on examining the area mentioned by FOOTE, we found that these objects need not necessarily belong to the prehistoric period as thought by him. For the place being on a lower level than the village, receives all the refuse—washings from the village, and hence is littered with potsherds.

SURFACE MICROLITHS FROM BODELI

Bodeli (73°·46′ and 23°·17)[40] is situated on the right bank of the Orsang. FOOTE mentions only one specimen, No. 345, out of his small collection made about the surface north of the railway station.[41] We could not find anything near about this site. Our search took us further up to Dokeriya which yielded a splendid collection which is described later. But while returning along the bank of the river, we found a few pieces of quartzite, chert, and quartz, about 2 miles south of Bodeli, near a ruined mediaeval temple. Some of the quartz pieces are good specimens of semi-circular, one-edged blades or scrapers. The quartzite sample No. 780, has a well-flaked face, and a cortexed butt. Its purpose is not clear. The chert piece, No. 781 seems to be a core. It is flaked along its elliptical border, leaving a patch of cortex on the face and underside.

SURFACE MICROLITHS FROM BHULWAN

Bhulwan (73°·38′ and 22°·13′)[42] stands on the right bank of the Orsang. Here the bed and bank of the river are rocky, mostly granitic. Large number of quartz and agate chips were found on the surface. But it appeared that these were mostly natural pieces and only those which looked like artifacts were collected. This collection is very small, and even from it only one, No. 856, a crescentic, worked-back-like blade deserves notice.

38 *Indian Prehistoric and Protohistoric Antiquities. Notes on Ages and Distribution*, p. 136, and *Catalogue Raisonne*, p. 191–95.
39 FOOTE, *Notes on Ages*, p. 138.
40 Survey Sheet, 1″ = 1 mile, No. 46 F/11 × 15.
41 FOOTE, *Notes on Ages*, p. 144; *Catalogue*, p. 196.
42 Survey Sheet, 1″ = 1 mile, No. 46 F/12.

Surface Microliths from Sigam Kanbi

Sigam Kanbi (73°·40′ and 22°·6′)[43] seems to be identical with the Sigam which Foote had visited,[44] because both lie on the right bank of the Heran river, and there is no other Sigam in the vicinity. But compared to Foote's collection ours is very small. Only one, small blade No. 869, two-edged, and bearing a parallel flake scar on face may be mentioned.

Surface Microliths from Songir

Songir[45] (73°·41 and 22°·7′) stands on the right bank of the Heran, about a mile to the north-east of Sigam Kanbi. The famous sandstone quarries, which go by this name, however, lie on the opposite bank. Out of its very small collection, No. 871, a core-scraper, No. 870 a blade-scraper, two tiny double-edged blades, Nos. 875, 877, and a small disc-like object, No. 880, deserve mention. Almost all of these are of agate or chalcedony, whereas No. 870 is of white and yellow veined quartz.

Surface Microliths from Dokeriya

Dokeriya in popular parlance and Dhoklia[46] or Dholai[47] of maps (73°·46 and 22°·16′) is situated on the right bank of the Orsang, about a mile north-east of Bodeli, a station on the Gaekwar Dabhoi Railway. It is comprised within the Chhota Udepur State. The site is right on the river bank, only a few feet above the river-bed. The collection is the finest we made on the Orsang. Not only is it large (Nos. 794–847)[48], but it is varied and contains a fine series of cores, blades, scrapers and points.

Among cores three deserve mention: Nos. 793, 797[49] and 799. No. 793 is perhaps the finest core of the entire collection. Several flakes have been removed from it. No. 797 is slightly rolled; No. 799 is quite fresh. Both however retain clearly the flaked face. Since they are edged, they might have served as scrapers.

There are several good blades, two-edged, and one-edged with curved back. No. 801 is small, perhaps a broken piece, of a two-edged blade; one edge is retouched; the face has 'step cut'; bulb on underside. No. 815[50] has a beautifully flaked face, bulb, and sharp edge. Another of chert, almost identical in technique, is No. 836 No. 820 is a tiny piece of one-edged and No. 821[51] of double-edged blades. The rest are all of quartz. Here good specimens

43 *Ibid.*
44 Foote, *Notes on Ages*, p. 138; *Catalogue*, p. 195.
45 Survey Sheet, *op. cit.*
46 Survey Sheet, 46 F/11 × 15; 1″ = mile.
47 Survey Sheet, 46 F/; 1″ = 4 miles.
48 See Pl. XIV (9, 14, 15), Pl. XXV (7, 8, 9), Pl. XXVI (7, 11, 16), Pl. XXVII (8. 15) and Pl. XXVIII (4, 6, 14).
49 See Pl. XXV (7, 8).
50 See Pl. XIV (9) and Pl. XXVIII (14).
51 See Pl. XXXVIII (6).

include No. 811, which is plano-convex, two-edged, resembling a broad spear-head and has a small bulb on underside; Nos. 830 and 831[52] (of chert) may be worked-back crescentic blades or scrapers.

Nos. 807, 819, 844, 846 and 847 are fine specimens of scrapers[53]. No. 847 particularly is a fine example of Levellois-like flake. Of the two quartz points, Nos. 839 and 840, the former is the first and the only specimen of an awl or a pseudo-awl, since its bottle-like thick body, and narrow, projecting point are made on a flake; the trimming is carried round through 180°, and the flat under-surface is left untrimmed.[54] No. 840 has a sharp point.

52 See Pl. XXVII (8).

53 See Pl. XIV (14, 15), Pl. XXVIII (4) and Pl. XXVI (11).

54 Cf. BURKITT, *The Old Stone Age*, p. 56 and Fig. 5, Nos. 6, 7, 8.

CHAPTER III

PART II

EXCAVATIONS AT HIRPURA AND LANGHNAJ

(A) Excavations at Hirpura

As mentioned before it was decided to excavate the Kashedio Ṭimbo at Hirpura. In order to test the productivity of the 'mound', diggings were made at three different places. The first digging, called Pit I, was near the north-west corner, the second called Pit O, at a few feet away from the first, towards the centre of the 'mound' and the third called Pit II at the other end (southern corner,) of the 'mound'. Pit I was 6 feet by 4 feet and was dug to a depth of 6 feet. Microliths (abbreviated into micros) were found up to 5 feet 6 inches, but lower down was virgin soil, consisting of a few shells and kankar. Potsherds were found up to 3 feet.

The second, Pit O, was merely a trial pit. Here detailed measurements of finds at every few inches were not taken. But the depth of finds was taken at every one foot.

The third, Pit II, was 6 feet by 6 feet and was dug to a depth of 6 feet.

As mentioned in the introduction the depth of antiquities was noted at approximately every three inches in Pit I and Pit II, and samples of soil collected at 8, 24, 36, 44, 60 and 72 inches in all the pits.

Following the method adopted in discussing palaeolithic finds it appears advisible to give briefly in a tabular form the objects as they are found at each level; discuss their nature and importance; then deal similarly with the objects at the next level, and compare them with those of the preceding stratum, leaving a general resume of the objects found to the end. This method, it is hoped, will enable the reader to grasp the essential details at each step in the excavation as well as acquaint him with its general nature.

D-1 Pit I.[52]

Micros: The so-called micros all seem to be rejects. Majority of them are either broken parts of blades or scrapers. Of these No. 4, almost the half of a convex-ended quartz blade is a good example. The rest have been included in the list for purposes of record only, but have little value.

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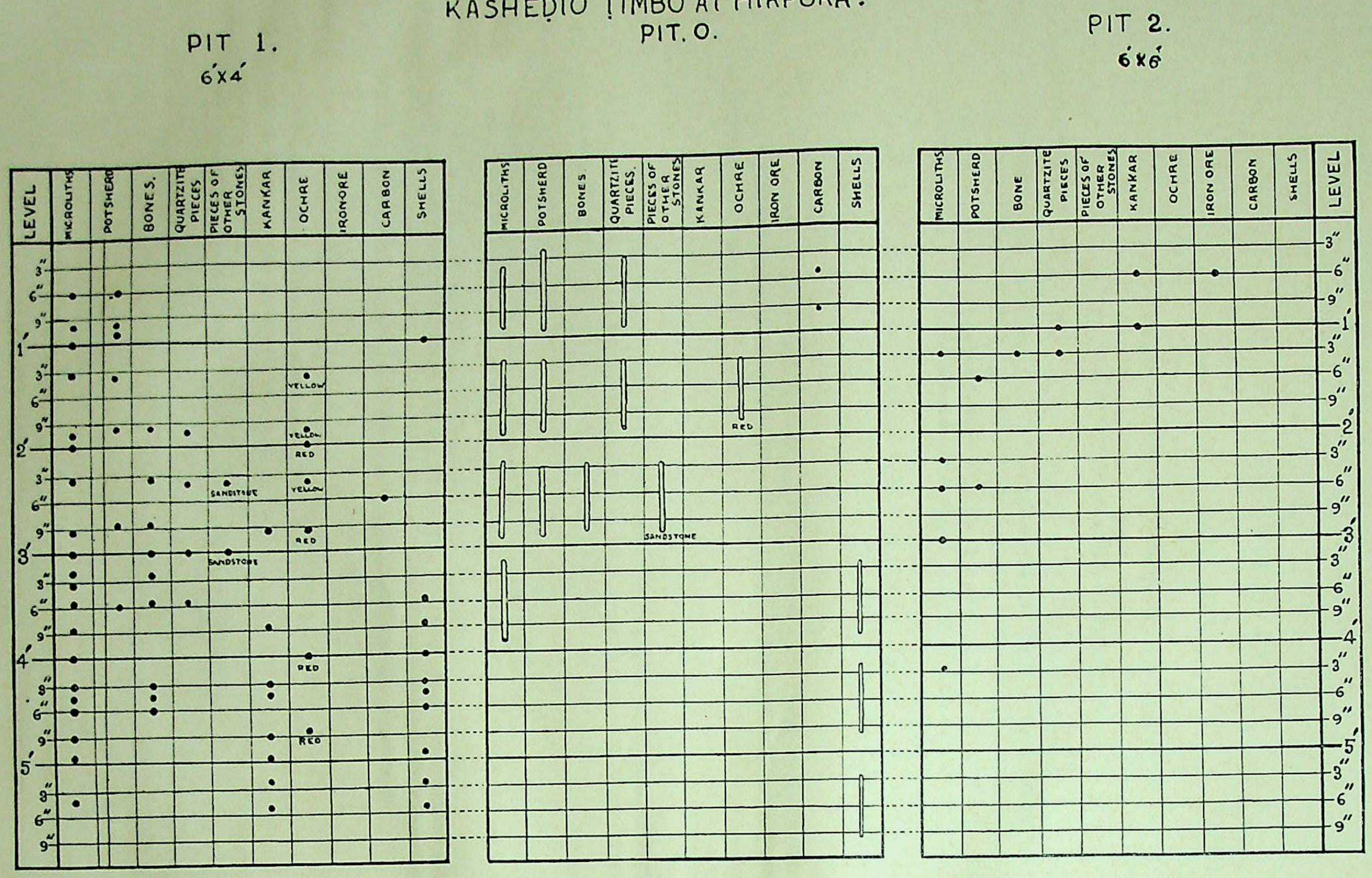
52 For illustrations see Pls. XVI and XXIX (a).

EXCAVATION OF KĀSHEḌIO ṬIMBO AT HĪRPURA.



NOTES.

Stratigraphical position of antiquities shown thus,

• Exact position.

‖ Approximate position.

Generalized section through the excavation Pits sunk at Kashedio Timbo, Hirpura.

Potsherds: Small potsherds found at all the three or four sub-levels are interesting. In the main they represent two kinds of pottery, viz. red and black. Each is further divisible into sub-types according to the colour and thickness of sherds. Thus No. 9 has a smooth red surface, owing to a red wash and slight polishing (?); the inner side is brown and coarse.

Nos. 10–14 have a smooth, bright red surface, and coarse brown underside. Both these types seem to be wheel-made pottery; the clay well-levigated and shows traces of mica in it. It is a comparatively thin ware, about $\frac{1}{4}$ inch in thickness.

No. 19 is a solitary piece of a thick, coarse dusty brown ware.
Nos. 20–22 represent medium to thick ware, coarse brown on both sides.

Similarly in blackware Nos. 15, 18 and 27 are thick; No. 15 is fragment of a rim, black on both sides.

Nos. 23–26 represent medium ware, but black on both sides.

Nos. 16–17, are pieces of a ware, coarse dusty brown on one side, and black on the other.[53]

D–2

Micros: The finds of the first sub-level are not the finest type of micros, but every one of these seems to be the outcome of artificial chipping, though it is doubtful if many of them served as implements. There is no good core; but No. 31[54] may have served as a blade, and been a core too.

HIRPURA EXCAVATIONS

See pages 64–65

Pit 1
D 1 (0 to 1 foot)

1 Micros	2 Potsherds	3 Bone splinters	4 Large stone pieces	5 Yellow Ochre	6 Red Ochre
In all 8 pieces selected. 6″ simple flakes Nos. 1–3 10″ Do 4–6 12″ Do 7–8	6″ Red ware: (a) No. 9 (b) Nos. 10–14 10″–11″ Red ware Types: (a) No. 19 (b) Nos. 20–22 Black ware Types: (a) Nos. 15–27 (b) Nos. 16–17 (c) Nos. 18, 23–25, 28–30	Nil.	Nil.	Nil.	Nil.

53 For a detailed description and discussion see below Chapter IV, Part II, Potsherds from Hirpura.

54 See Pl. XVI (7) and XXIX (12).

In (b) small, flat, long or short flakes, there are several good specimens; No. 39 can be used as a knife. The only instance in (d), No. 40 [55] seems to have been worked into a point at one end. Its sides are also sharp.

In the second and the third sub-levels the cores are not excellent specimens of the kind, but do show marks of chipping. It is doubtful if the points and blades were all intentionally made and used so, though they could have been used for the purposes of cutting or piercing, if required.

Some of the flakes in (ii a) are of quartzite. And it seems that this stone or pebble was used as a hammer, for very few small implements of it are found; whereas while hammering small chips might have flaked off.

Potsherds : These are numerous as in D 1, but the pieces are smaller. In red ware. No. 109 is identical with No. 9.

No. 106 with Nos. 10-14; No. 107 with Nos. 20–22.

No. 110 is a piece of medium to thick ware, originally bright red on both sides but now dusty.

No. 118 is similar in colour to No. 19 above, but thinner.

No. 119 is a piece of thick ware; smooth chocolate brown originally perhaps on both sides, but now on one side only.

No. 108 is similar to No. 113, but it is thicker and coarser.

In backware there is no new type. Nos. 83, 90,114–118 are identical with Nos. 15, 18, 27 above; Nos. 84, 87, 89, 92–96 with Nos. 23–26 above.

Thus five new sub-types in red ware are found in the second stratum, whereas the rest have continued to survive from the first stratum.

Bone Splinters : Of the items in columns 3 to 6, bone pieces in No. 3 may be first considered. Of the five pieces one No. 134, is a little blackish, as if it were "charred"[56]; the rest are whitish and seem to be fossilized.

Quartzite Pieces : The two quartzite pieces, Nos. 123 and 124, indicate the use of this stone for some purpose by the microlithic man. No. 124 a semi-circular piece may have been purposely fractured, but it has no marks of further flaking.

Yellow or red ochre (?): Nos. 101, 125 and Nos. 131–32 found at two sub-levels look like lumps of yellow and red ochre respectively, but they are actually lumps of limonite coated silt, a natural formation in the loess.[57]

D–3

Micros : Compared with finds from D 2 there is a larger number of micros, but no difference in quality is discernible. Among cores, No. 145, an almost rectangular piece of chert, about an inch long, is a good specimen of its kind. One of its edges seems to have been used for scraping etc. as the polish and smoothness of its surface would indicate.

The presence of quartzite pieces is already noted above.

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55 See Pl. XVI (3) and XXIX (14)

56 The carbonization may be due, as Prof. K. V. KELKAR pointed out to the writer, also to the prolonged burial and other causes and may not suggest the use or existence of fire at the site.

57 The writer owes this explanation to Prof. K. V. KELKAR.

HIRPURA :EXCAVATIONS

PIT 1

D 2 (1 foot to 2 feet)

See pages 65–66

1	2	3	4	5	6
16″–17″. Nos. 31–56 selected. These include:— (i) Flakes: (a) Large or medium sized, thick Nos. 31–35, 43 (b) Small, flat, long or short. (c) Small lunates. Nos. 44, 45, 50. (d) Point. No. 40.	Blackware : types : Nos. 83–96 ; 106–113; (a) Nos. 83, 90 (similar to 15, 27 of D1 (b) Nos. 86, 112 " 16, 17 (c) Nos. 84, 87–89, " " 23 " Red ware : types : " " (a) No. 106 (similar to 10 of D1) (b) Nos. 107, 111 (20 " (c) No. 108 (d) No. 109 " 9 " (e) No. 113	Nil	Nos. 97–104 Kankar.	No. 101 (one small piece) Limonite coated silt.	Nil.
22″ Nos. 59–79 selected. These include :— (i) Cores : Nos. 57, 59, 78 (?) (ii) Flakes: (a) Small : Nos. 60–65 (b) Small, flat, short or long blades. (c) Points: Nos. 66, 68, 79, 81.	Nos. 114–122 Red ware : types : (a) No. 118 (b) No. 119 Black ware : types : (a) Nos. 114–117, 120 similar to 18 of D I	Nos. 135–138 All fossilized. No. 136 "charred."	Nos. 123–124 Pebble-flakes of quartzite.	No. 125 (one large lump). Limonite coated silt.	Nil.
24″ Nos. 80–82 (small blades).	Nil.	Nos. 131–133 (ferruginous sandstone).	Nil.	Nil.	No. 131–32 Limonite coated silt.

Among blades, some are so thin and fine, and so sharp and fragile as to be useful only on rare occasions; daily use might soon break them. Probably such blades were easily made as LEAKEY [58] has shown. One of them, No. 159,[59] about an inch in length has a sharp point, and a similar side. It might have been an arrow-head.

From amongst the micros at 34″, No. 174 is a good core. Majority of the blades are fine specimens, whereas No. 196[60], is a pointed crescent, with an extremely sharp point and side. No. 197, a triangular piece, has a slightly bent sharp point like the parrot-beak. There is nothing particular to remark about the six specimens from the third sub-level.

Potsherds : Only three pieces were found at 32″. Of these 2 pieces are of coarse, brown, thin pottery, similar to but not identical with Nos. 20–22. One tiny piece has a bright red surface, but it is so small as to make comparison with the other wares difficult.

Bone Splinters : These were found throughout at all the 3 sub-levels. Many of these seem to be fossilized. Nos. 209–210 resemble microliths. If not natural splinters, they would imply a similar bone industry.

Stones etc. Besides pieces of quartzite, small grains of granite and lumps of limonite coated silt, lumps of haematite, or red ochre were also found; since these could also be formations in loess, they might be considered as natural products.

A piece, No. 276, which looks like carbon is a fully charred bone piece.

Kankar

Small nodules of these begin to appear at 34″.

D–4

Micros

Among these at 38″ may be noted the appearance of long, blade-like cores, Nos. 278,279[61]. They are roughly but definitely worked. No. 278 may have been used as a knife it being thick on one side, and thin and sharp on the other, like our one-edged knife blades.

The quartzite piece, No. 276, is a good flake, resembling a lunate blade. Other smaller blades are of the type met with in earlier levels.

At 41″ two fine discoid cores deserves notice. These are: No. 306 of mottled pink chert, well worked all over; the other No. 307 of brownish or snuff coloured chert[62]. There are also a number of good broad, flat flakes, which might have been used as blades or scrapers. Among smaller blades, No. 327[63] is an extremely sharp pointed blade. No. 311 is a triangular blade, sharp on all the three sides.

58 LEAKEY, *The Stone Age Cultures of Kenya*, p. 98.
59 See Pl. XVI (12).
60 See Pl. XVI (10).
61 See Pl. XVI (1) and Pl. XXIX (2).
62 See Pl. XVI (6) and Pl. XXIX (3).
63 See Pl. XXIX (15).

But the finest is No. 315,[64] a triangular piece of brownish chert, about $1\frac{1}{2}$ in length, about an inch in breadth, and $\frac{1}{2}$ inch thick. It has a clean flaked undersurface; the upper surface has a mid-ridge, having one of its slopes flaked, the other retaining the original cortex.

At 44″ we have another fine discoid core in No. 337, and a core-like flake in No. 338[65].

Of the 7 pieces at 48″, Nos. 342, 343[66] are of coarse quartzite, and one of them a definite flake. No. 342 could have served as a fine lunate blade. Among other blades No. 347 is a sharp pointed, fine specimen.

64 See Pl. XVI, (24) and XXIX, (13)
65 See Pl. XXIX (8)
66 *Ibid*, (10)

See p. 66 and 68

HIRPURA EXCAVATIONS
Pit I
D 3 (2 feet to 3 feet)

Micros 1	Potsherds 2	Bone splinters 3	Large stone pieces and pebbles 4	Yellow Ochre 5	Red Ochre 6	Kankar 7
28″. 42 pieces selected. (i) (a) Cores : Nos. 141-42. (b) Core-flakes : Nos. 143-50 (ii) Flakes (blades) : long, thin, flat, some lunates and pointed : Nos. 151-71. (iii) 2 quartzite pieces.	Nil.	Nos. 205-10 fossilized; two Nos. 209-10 tool-like	Tiny grains of granite. (ii) Nos. 221, 223-31 of quartzite, grit and sandstone respectively.	Nos. 238 246-260 Limonite coated silt.	Nos. 266-72 small grains in a packet.	Nil.
34″. Nos. 172-97 selected. These include :— (i) (a) Cores : Nos. 172-179. (b) Core-flakes : Nos. 180-83 (ii) Flakes: (a) thin, broad flat : Nos. 184-88 (b) Thin, long, flat, Nos. 189-97. Nos. 196-97 are pointed.	Three tiny (now 2) soft porous pieces at 32″. Nos. 272-74	Nos. 211-17 fossilized.	Nil.	Nil.	Nos. 234-37 haematite (iron oxide or red cchre).	
36″. 6 pieces selected. of these (i) Cores : Nos. 199-200 (ii) Flakes (blades); Nos. 201-02.	Nil.	Nos. 218-220 fossilized.	Nos. 224-28 230-233 (sandstone).	Nil.	Nil.	Nil.

HIRPURA EXCAVATIONS

Pit I

D 4 (3 feet to 4 feet)

See pages 68–69

Micros	Potsherds	Bone splinters	Large stone pieces	Granite grains	Yellow or Red ochre	Shell	Kankar
38″. 27 pieces selected. Nos. 276–302. (i) Core-flakes: Nos. 277–80. (ii) Flakes (a) Small, scraper-like: Nos. 281–87. (b) Small, thin, flat (blades): Nos. 288–302. (c) Large lunate of quartzite: Nos. 276.	Nil.	Nos. 355–8. All fossilized.	Nil.	Nos. 368–75	Nil.	Nil.	Nil.
39″. 1 flat blade: No. 303.							
41″. 33 pieces selected. Nos. 304–336. (i) Cores: Nos. 305–07, 318. (ii) Flakes: (a) Large, flat, scraper-like: Nos. 304, 308–312, 322, 335. (b) Medium-sized blades: Nos. 313–15. (c) Small, thin blades: Nos. 321, 323–34, 336. (d) Lunates, pointed: Nos. 321, 323, 329.	Nil.	Nos. 359–68 three charred.	Nos. 376–77.	Nos. 349–52. (i) 1 split pebble. (ii) 1 coarse lump and one tiny piece.	Nil.	No. 354.	
44″. 5 pieces selected (Nos. 337–41) (i) Core, and core-flake. (ii) Blades.	Nil.	Nil.	Nil.	Nos. 378–9	Nil.	Nos. 380–1	Nos. 382–87
48″. 7 pieces seletced. (i) Blades, medium sized. Nos. 342–44. Small, Nos. 345–48.	Nil.	Nil.	Nil.	Nil.	No. 353 1 small lump of limonite coated silt.	Kankar and	shell in large number.

Potsherds are completely absent at this level.

Bone Pieces: Small pieces of bone continue to appear up to 44″. All of them seem to be fossilized and three tiny pieces are "charred".

Quartzite Pieces: These are very few compared to the number in earlier levels. One of these is a split pebble, others are small and granular, perhaps of sandstone or very coarse quartzite.

Yellow ochre (?): Only one lump of limonite coated silt, which looks like yellow ochre occurs at 48″.

Shells and Kankar: As we go down deeper, the number of shells and kankar increases.

D–5

Micros: These occur all throughout till 59″. Quartz pieces are in majority. Of these two, Nos. 394 and 409, look like core-scrapers having one of their sides sharp. No. 393 is a good specimen of a blade or a part thereof. Among other flakes, Nos. 408, 410, 411[67] have got a battered or worked-back, and fine sharp sides.

No. 398 is a small but definite specimen of a quartzite core.

Unlike other microliths from earlier levels, many of the specimens from this level are encrusted with a thin film of silt, containing carbonate of lime, which does not easily flake off.

No pottery as in D–5

Bones: Pieces occur up to 54″. Some of these are very heavy, because they are fossilized and are also full of loess. One of these pieces from 54″ depth is "charred".

Quartzite and other stones: These disappear at the end of this level. Only one core, No. 398, of quartzite occurs at 52″.

Red Ochre: Granules of kankar with patches of limonite and haematite are found even up to 57″.

Shells and Kankar: These now appear in profusion. Among shells there are a few of the Helix variety; the rest are of gastropod type.

D–6

Micros: A small piece of mottled fleshy chert, No. 484, quadrant or triangular and sharp on one side was found at 65″.

Shells and Kankar: These are the only other finds at this depth.

67 See Pl. XVI (8) and Pl. XXIX (11).

Pit O

D–1 and D–2.

Micros: There is nothing particular to note about microliths. For some reason only a few pieces were found at these two levels, and that too crude cores; hardly any flake or blade.

The presence of a solitary carbon-like piece cannot be easily explained. If "charred" bones were found it might have come out of such bones.

Potsherds: As the table overleaf shows four types of pottery were found in the first stratum D–1. Since their detailed description is given later, it would suffice to note here that (i) Nos. 497 a–d, and (ii) 490–92 are fragments of a thick plate or dish, which was definitely wheel-made.

Five types of pottery are indicated by the potsherds from the second stratum D–2. All seem to be pieces of wheel-made pottery of which that represented by No. 505 is certainly the best.

HIRPURA EXCAVATIONS

Pit I

D 5 (4 feet to 5 feet)

Micros	Bone Splinters	Yellow or red ochre	Shells	Kankar
51″ 6 pieces : 4 small flakes (4 of quartz). Nos. 392–97.	51″ 5 pieces. Nos. 425–29. Fossilized ; some charred.	51″ Nos. 419–24 Kankar with patches of limonite and haematite	51″ 15 pieces. Nos. 451–65	51″ large quantity
52″ 12 pieces i (a) quartz core-flake (b) 2 cores ii (a) 1 long irregular flake. (b) 8 small flakes. Nos. 399–408.	52″ 14 pieces, small and big. Nos. 430–43 Fossilized; some charred.		52″ 4 pieces. Nos. 466–69.	52″ Do
54″ 5 pieces: Nos. 409–413. 2 Core–scraper : Nos. 409, 12 (a) 2 long blades Nos. 410, 411. (b) 1 tiny flake No. 413.	54″ 6 pieces. Fossilized; one of them charred. Nos. 444–49			
57″ 3 tiny pieces, flakes : Nos. 414–17.		57″ one piece No. 450.	57″ 7 pieces. Nos. 470–76 A few spiral, (Helix); rest conical. (Gastropod)	57″ Do
59″ 2 tiny, pieces, flakes : Nos. 417–18.				

D 6 (5 feet to 6 feet)

62″ Nil

65″
1 piece quadrant
No. 484

HIRPURA EXCAVATIONS

PIT O

D 1 and D 2

Micros	Potsherds	Quartzite	Iron Oxide
D1 5 pieces, Nos. 485–89 Small rough cores.	12 pieces, Nos. 490–97a–d. These include:— (i) Thick black potsherds, brown or dusty on the other, Nos. 497 a–d. (ii) Thick red potsherds, Nos. 490–92. (iii) Thin, brownish, owing to thick coating of silt (?) coarse, No. 494. (iv) Thin blackish ware, smooth on one face, coarse on the other, Nos. 493, 495–497. (Similar to Nos. 23–26 of Pit 1, D1.)	Quartzite pieces Nos. 498–99	One Carbon-like piece, of No. 500
D2 One piece of quartz blade. No. 501.	5 pieces Nos. 502–506 These include:— (i) Very thick black pottery, fragment of a rim, No. 502. (ii) Thin dark red, smooth on one side, coarse on the other, No. 503. (almost similar to No. 9 and 109 of Pit 1, D1 and D2). (iii) Medium, light red, part of a rim smooth inside, No. 504. (iv) Medium, black, rough on both sides, No. 506. (Similar to No. 15 etc. of Pit I). (v) Medium, snuff-brown, smooth, polished on the upper side; coarse brown on the other.	Pebble pieces Nos. 507–12	One large lump.

HIRPURA EXCAVATIONS

Pit O

D 3–D 6

1 Micros	2 Pottery	3 Bone	4 Stone	5 Red ochre or a piece of brick
D 3 Nos. 514–532. These include:— i. Cores, large, medium and small, Nos. 514–518. ii. (a) Large flakes, Nos. 519–522. (b) Small, thin, flat, blades, Nos. 524–528. (c) Miscellaneous.	Nil	One piece	2 pieces of coarse, ferruginous sandstone. Nos. 534–535,	No. 536
1	2	3	4	Shell
D 4 Only two finds of Quartz, Nos. 537–38.	Nil	Nil	Nil	Two types: Helix and Gastropod, Nos. 545–552.
D 5–6 Nil.	Nil	Nil	Nil	Helix, Gastropod Nos. 545–552.

HIRPURA EXCAVATIONS

Pit II

D 1–D 4

	Micros	Potsherds	Bone	Quartzite	Kankar	
D 1				No. 558	No. 544–54 No. 557 a large lump	No. 533. A lump of igneous rock
D 2	(a) Quartz piece No. 559	(i) Bright red on one face (ii) Coarse brown Nos. 562–563	White, No. 561	Pebble No. 560		
D 3	(a) Piece of black chert No. 564 (b) Piece of pointed core No 565 (c) Piece of Quartz blade No. 566	Nos. 567–69 Thick, coarse brown				
D 4	(a) No. 570 Fan-shaped haematite scraper ?					

Quartzite Pieces: Quartzite pieces and a lump of ochre invite no fresh comment.

D-3

Micros: At this level a large number of finds were made, and some of the largest cores, though very crude, were found here. Of the 19 specimens, one No. 521[68] seems to be a large arrow or spear (?) head, and resembles a similar piece No. 315 from Pit I.

From the next stratum only micros were found, and from the subsequent only shell.

Pit II

This pit was dug at the other end of the mound with a view to testing the impression formed by surface finds from this area. Like the surface collection, there was indeed a paucity of finds from the digging, indicating that the corner was sparsely inhabited or used by the microlithic people. Not only micros, but even other associated articles–quartzite pebbles, potsherds, bone splinters, etc. were found in very small quantities. But that this corner was occupied is proved by the finds of micros : two of them Nos. 564[69] and 570 are good specimens of a worked-back, and a chisel-shaped blade respectively and a few pieces of pottery at three feet, and one piece of micro below this level. So this Pit though uninteresting and unimportant from the point of view of finds, served the purpose of showing the occupancy of the mound.

Potsherds: Of the 5 potsherds from this Pit three Nos. 567–69 are fragments of an ill-baked reddish pottery, which was definitely hand-made. Of the other two Nos. 562–63, the tiny piece of medium width has a reddish surface on one side, but the rest is greyish. The second is thinner, having a dull brown appearance, and blackish core, and uneven surface. Both these seem to be hand-made.

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68 See Pl. XVI (20).

69 *Ibid* (19).

(B) Excavations at Langhnaj

Surface explorations revealed that hillocks, Mound I and II, were promising sites for excavation. Accordingly, the flat, topmost portions of these mounds were selected for trial diggings.

Mound I

On Mound I a pit 6 feet by 4 feet was dug up to a depth of 11 feet. Micros were found up to 6 and 7 feet, and some bone pieces in the 8th stratum (7 feet to 8 feet) and two pieces of bones in the 9th stratum. Below 10 feet there was nothing but virgin soil consisting principally of kankar. Potsherds were found even in the 5th stratum and a terracotta torso of a figurine in the 3rd stratum.

The finds from each stratum are shown in parallel columns below.[70]

D–1 Pit I[71]

Micros : Cores are very ordinary, below average. But if we include in this group, group iv, consisting of "discs" or "core trimmings" then mention must be made of No. 3, which is about ½ an inch in diameter, almost perfectly round, smooth on the under surface, because broken by Levallois–technique, having a striking platform and minutely faceted on the upper surface. Blades are of the usual type, many of them fine; but among the crescents, No. 14 if not accidentally so fractured, is a good and only example of a hook. It is about an inch in length, has a worked–back, sharp edge on the other side, and a curved protruding point on one end, whereas the other is flattened. It might have been used for fishing and similar other purposes. If it is proved to be a hook, it would be a unique example of the kind in India (?). Another specimen No. 17 might have been used because of its uneven or indented edge.

Among triangular specimens, No. 38, deserves notice. It has a thin protruding point, thick at the butt. Less than ¼ inch in length, it would be a fine example of a delicate awl.

No. 26, included among crescents, calls for attention because of its smooth polished surface all over. It is a piece of crimson, or chocolate chert, ½ inch in length; has a curved worked-back and a smooth, flat opposite side. The sides around must have been either purposely worked into a smooth polished surface, or they must have so become by use or grinding etc. as do those of a rubber, or a piece of sandlewood. Anyhow it is a unique piece of a completely polished implement heralding Neolithic times (?)

Potsherds: Only one piece, No. 39, was found at this level. It is of buff coloured, but very thick pottery, smooth on both the surfaces and having incised lines on the exterior. (It cannot be traced now).

Bone Splinters: Among these No. 40 seems to be a tooth. Nos. 41–48 semi-fossilized pieces, while Nos. 50–58 are similar, but partly "charred". Of these Nos. 51–52, 58 seem to be in the process of being made into tools.

70 Experience at Hirpura showed that it was not necessary to divide a layer into 3 or 4 sub–layers, consisting of 4 or 3 inches each, for no natural stratification was observed. Since our purpose was served by having layers of a foot each, the former method was not followed here.

71 See Pls. XVII–VIII and XXX–XXXI.

LANGHNAJ EXCAVATIONS

MOUND I PIT I

D 1 (0 to 1 foot)

Micros	Potsherds	Bone splinters
Nos. 1–38 and No. 56 selected (over 100 pieces rejected). The selected pieces include :— (i) Thick core-flakes : Nos. 1–7, 9 (ii) Roundish flakes (scrapers ?): Nos. 10–12 (iii) Flakes (blades) (a) Long, two-edged: No. 8 (b) Small, thin, flat : Nos. 16, 18–21, 23–25, 27, 34, 37, 56 (c) Similar but crescents, and at times pointed at one or both ends : Nos. 13–14, 17, 22, 25–26, 30–33, 36. (d) Similar to (c) but angular : Nos, 28-29, 35, 38. (iv) Small disc-like pellets or "core-trimmings": Nos. 3, 11, 15	No. 39 (Now lost)	Nos. 40–58. These include :— (i) A tooth (?) : No. 40. (ii) Ordinary pieces: Nos. 41–48. (iii) A piece with a natural impression on it (?): No. 49. (iv) "Charred" pieces : Nos. 50–58.

LANGHNAJ EXCAVATIONS

Mound I Pit I

D 2 (1 foot to 2 feet)

Micros	Potsherds	Bone fragments	Shells
Nos. 59–77 selected (over 50 were rejected). The selected pieces include :— (i) Small rectangular cores : Nos. 60-62. (ii) Flakes (a) Thin, two-edged, blade : No. 59. (b) Thin, broad and flat: Nos. 63-66. (c) Thin and flat : Nos. 63–73. (iii) Small pointed Nos. 74–77.	Three 'types' as under :— (i) Thin, smooth, red surface etc. No. 78. (ii) Thick, smooth, black on both sides, part of a rim, No. 81. (iii) Coarse, reddish, porous and soft. Nos. 79–80, 82–93.	No. 85	Freshwater gastropod. No. 86–87

D 3 (2 feet to 3 feet)

Micros	Potsherds	Bone splinters	Shells
Only three selected out of a few found. Nos. 88, 89, 91.	Smooth, brick red. No. 93: Torso of a figurine. No. 92:	An implement ? No. 90	Fresh water gastropod. Nos. 94–95

D 4 (3 feet to 4 feet)

Micros	Potsherds	Bone splinters	Shells
Only one No. 96.			Nos. 97–98.

D–2

Micros : Very few out of the numerous microliths recovered, were good. Of the pieces selected, the finest is No. 59[71a], a knife-like blade, about 1½ inch long, having a narrowed convex point, midridge, broad end and 2 sharp sides.

Potsherds : Out of the two pieces, No. 75 is thin and has smooth red surface, and coarse brown inside. The other, No. 81, is a fragment of a thick rimmed ware, black on both sides.

It seems to be similar to the type of black ware found at Hirpura.

Nos. 79, 80, 82, 83 are coarse brown as if of brick. They are extremely porous and soft.

Bone : One piece, No. 85, plano-convex in shape, has a worked-back, and smooth sides and looks like a grinding or polishing implement, for it has no sharp edges. It may be a "smoothing" tool.

Shell : Two 'conical' fresh water gastropod shells were collected.

D–3

Micros : There is nothing to comment on micros from this level except the fact there is a dearth of them.

Potsherds : The same is true of potsherds, but here the deficiency is made up by a terracotta figurine, No. 91[72]. It is brownish externally, mostly smooth, but coarse and uneven at places. It seems to be a torso of an animal having a long neck, and squatting on its forelegs, which as well as the hind legs are now broken. A part of the face, above the lower lip is peeled off, but a small shallow incision in front seems to indicate the lip, as do the oblique incisions on the back, in a horizontal band, the hair (?); or is this, slightly thick, broad (½ inch) band something like a collar band ? The figure's base has a diameter of about 1½ inches, and in height it is about 3¾ inches. No. 90 is a charred bone piece; its smooth flat under surface and faceted sides, particularly the bevelled front suggest that the piece may be an implement. Shells No. 94–95 are of the ordinary freshwater gastropod type.

D–4 and D–5

Potsherd : There is nothing to write about finds from these layers except for the potsherd No. 100 from D 5. It is a large piece, convex at one end, pointed at the other, of a very coarse thick, dust–ash coloured pottery. It seems to be hand-made and imperfectly fired. The texture of the clay is very coarse.

Of the bones some are fossilized, while others look "charred".

D–6

Micros : Micros are again very few. But among them No. 107, an almost semi-circular piece, like a miniature elephant tusk with a well–trimmed back, and sharp projecting upper edge, and a smooth faceted butt–end deserves

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71a See Pl. XVIIIa (11).

72 See Plate XVIII, b

LANGHNAJ EXCAVATIONS

Mound I Pit I

D 5 (4 feet to 5 feet)

Micros	Potsherds	Bone splinters	Stone pieces
Only one : No. 99.	Thick, coarse, blackish. No. 100.	Fossilized. Nos. 103–105. and "charred" on one side. 106.	Nos. 101–102.

D 6 (5 feet to 6 feet)

Micros	Potsherds	Bone splinters	Stone pieces
Nos. 107–113 (selected). These include:— (i) Thick flakes : Nos. 107–110. (ii) Thin flake. (iii) Disc-like pellet : No. 112. cf D 1: Nos. 3, 11, 15.	No. 114. Similar to No. 100. Part of a rim? thick, coarse, brown on both sides. No. 115.	All fossilized. Nos. 118–123	Nos. 116–117.

D 7 (6 feet to 7 feet)

Micros	Potsherds	Bone splinters	Stone pieces
Nos. 124–132. These include :— (i) Thick flakes : Nos. 125, 127–129. (ii) Thin flat flakes : Nos. 126, 130–131. (iii) Disc-like pellets : Nos. 124, 132. cf similar from D 1 and D 6.	Nil	All fossilized. Nos. 134–159	No. 133

D 8 (7 feet to 8 feet)

(i) Nos. 151, 59 all fossilized.
(ii) No. 190, a jaw with teeth.

D 9 (8 feet to 9 feet)

Two pieces of fossilized bone

notice. Likewise No. 113 is a broad chisel-like blade. No. 112[72a] resembles a similar "pellet" or "core trimming" No. 3, from D-1.

Potsherds : Of the two potsherds, No. 114 is a thick ill-baked piece, dark red on one side and dust coloured on the other, with a blackish core. It is undoubtedly of a hand-made, coarse pottery, similar to No. 100. No. 115 is a thick, triangular piece, perhaps part of a rim, coarse brown on both sides. It also seems to be hand-made, but is better baked than No. 114.

Bones : All the bone pieces from this level are fossilized.

D–7

Micros : The existence of micros at this level is interesting. Among the finds No. 128 is a good specimen of a pointed chisel, or awl, quite thick at one end and pointed and sharp at the other.

No. 132[73], a small, but thick flake of chocolate chert, has well trimmed edge. It may have been used as scraper.

Bone Splinters : All the bone splinters, numbering 16 in all, are fossilized.

Stone Piece : An ovoid piece of sandstone (?) or coarse quartzite (?) has its three sides rounded. It might have been used as a fling stone or a hammer-stone.

D–8

Bone Splinters : Only fragments of fossilized bones were found besides a semi-fossilized jaw, No. 190. According to Dr. CHATTERJEE, the jaw was the fragment of a human mandible with two molar teeth intact. The cusps of these teeth are much eroded, indicating the age of the person to be over 40 years[74].

Among other bones, he was able to identify a bit of a cranium.

D–9

Two pieces of bone, one fossilized, and the other partly, were found.

Mound II

This mound is situated across the pond. It rises gradually. Its topmost surface may be 50 or 60 feet high from the surface of the plain. Here two pits were dug. One, called here Pit I, on the elevated but flat surface of the mound; another, Pit 2, just near to its right, on a sloping surface. Both were 6 feet by 6 feet. Pit I was dug up to a depth of 9 feet, below which was virgin soil, consisting principally of kankar. A few micros were found up to 8 feet 6 inches, whereas a large quantity of them, small fragments of bone and shell were found up to 6 feet. Potsherds were found between 0 to 4 feet.

Pit 2 was dug up to a depth of 5 feet, below which there was virgin soil. Here too micros and bone fragments were found in plenty; and potsherds were noticed up to 3 feet.

The finds from both the pits are shown in parallel columns level by level, and discussed below.

72a See Pl. XXXI (23).

73 *Ibid* (14).

74 For a further description see Appendix IV.

LANGHNAJ EXCAVATIONS

Mound II Pit I

D 1 (0 foot to 1 foot)

Micros	Potsherds	Yellow Ochre	Bone splinters	Stone pieces
(i) Cores, Nos. 193–202. (ii) Flakes (blades ?) (a) long, two-edged : Nos. 203-7. (b) Small, thin and narrow: Nos. 226, 236–38. (c) Lunate or Crescentic: Nos. 239–47. (iii) Flakes (scrapers ?) square or roundish, thin and flat: Nos. 208–13. 215–23. (iv) Flakes (points ?) Nos. 214, 224, 229–35, 248 (?) (v) Small disc-like "pellets" or "core-trimming": Nos. 227-28 (cf. Nos. 3 etc. Pit. I, Mound I).	Nos. 249–55. These include:— (i) (a) Medium, coarse, dull-chocolate, No. 249. (b) Medium, coarse, brown dusty, Nos. 250, 255. (c) Thinner, coarse brown, No. 254. (ii) (a) Medium, coarse, black, No. 251 (b) Thick, smooth, black, Nos. 252, 253.	No. 256. A small lump of haematite coated sand.	Nos. 259–70.	Nos. 257–58.

D–1 Pit I

Micros : The large number of finds can be classified roughly into 5 types. A few of these deserve notice. The first is a blade, No. 203[75]. It is over an inch in length, slightly convex on the surface, and concave on the underside, with a sharp edge. It may have served as a small knife-blade.

Among the pointed specimens, No. 224, had an elongated narrow point, but is now broken. Other noteworthy specimens are Nos. 229[76] and 230, both having a sharp point, which could be used for any piercing purpose. Similar pointed specimens among the crescents are Nos. 241 and 242.

Here also tiny disc-like pellets or "core-trimmings" as in Mound I, Pit I, are found. These are Nos. 227, 228[77].

Potsherds : The small collection can be grouped into 5 sub-divisions as shown in the general list. This may be reduced to two: (1) coarse red ware, not well-baked; (2) rather smooth, black ware. The red as well as (b) No. 251 seems to be hand-made.

A small lump of yellow ochre-like haematite coated sand was also found.

Bone Splinters : One large and eleven tiny fragments. Most of these, including the large one are fossilized.

D–2

Micros : The number of finds is smaller than in D 1. A few of the core-flakes are good: Nos. 276[78], 284, 285. Both the long blades are rough and not well made. Among the medium-sized scrapers, Nos. 280, 286, 294 are good specimens. No. 294 is long and blade-like. Of the tiny blades Nos. 303,307, 310, 312 deserve notice. They are curved, pointed and sharp.

Potsherds : These are interesting. The first dull brown-black is definitely hand-made. Its other variety—brown, of well levigated clay—may be hand-made, and it is of good quality. But the most interesting specimens are Nos. 318, 320, 321, which are smooth on one surface and of very well-made pottery. No. 320 is definitely a piece of a wheel-made pottery.

Nos. 293, 324 are quartzite pieces.

Bone Splinters : Numerous fragments were found at this level. Among these those which are not "charred" are all fossilized, partly or wholly, and three Nos. 348 to 350 look like implements.

D–3

Micros : Here the cores are few. Of the two flakes, No. 364 of reddish chert is a fine specimen. Its upper surface shows at least 6 flake scars; whereas because of its gouge-like point, it itself could have been utilized as an implement.

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75 See Pl. XVII (12) and Pl. XXXI (6).

76 See Pl. XXX (6).

77 See Pl. XVIII (2, 10) and Pl. XXXI (16, 17).

78 See Pl. XXXI (12).

LANGHNAJ EXCAVATIONS

Mound II Pit I

D 2 (1 foot to 2 feet)

Micros	Potsherds	Bone splinters	Kankar
Nos. 271–312. selected (over 50 were rejected). The selected specimens include:— (i) Cores and core like flakes, Nos. 271–76; 284–85. (ii) Flakes (blades ?) (a) Long, two-edged, Nos. 282-83. (b) Small, rectangular, Nos. 300, 301, 304–05. (c) Small, tiny, crescent or crescent-like. Nos. 303, 306–12. (iii) Flakes (scrapers ?) (a) Medium, rectangular or roundish, flat, Nos. 279–81, 286, 293–96. (b) Small, rectangular or roundish, flat, Nos. 277–78, 287–89. (iv) Flakes (points ?) Thick and pointed Nos. 292, 297–99.	Nos. 313–23. These include:– (i) (a) Thick, brownish, coarse, ill-baked, brownish on either side, blackish internally, Nos. 313–15, 319. (b) Medium, smooth, yellowish core, Nos. 316, 321. (c) Thick–medium, coarse, dusty, brown, No. 322. (d) Thin, smooth, brown-red, No. 320. (e) Medium, white crust on thick red, No. 323. (f) Medium, smooth, creamy ? (ii) Thick black [similar to (a) of D 1] No. 317.	Nos. 325–329 330–337 338–341 (burnt) 342–350 3 implement–like Nos. 348–350.	Nos. 351–57.

LANGHNAJ EXCAVATIONS

MOUND II Pit I

D 3 (2 feet to 3 feet)

Micros	Potsherds	Bone Splinters	Stone pieces
Nos. 358–401 selected. (over 100 tiny and a few large pieces rejected). The selected pieces include :— (i) Cores (a) Rough : Nos. 358–60, 367. (b) Flakes : Nos. 364–65. (ii) Flakes (blades ?) (a) Medium, two-edged : Nos. 373, 392–93. (b) Small, thin, flat : Nos. 368–73. (c) Medium, crescent or crescent-like : Nos. 374–75, 377–87, 395. (d) Small, crescent or crescent-like : Nos. 388–91, 400–01. (iii) Flakes (scrapers ?) Medium, roundish, Nos. 362–63, 366, 394.	Nos. 402 404. Medium, smooth dull brown.	(i) No. 405 a small bag of fossilized bone fragments. (ii) Nos. 406–412 (not individually numbered). (iii) Nos. 413–15 Small, tiny tools. (iv) Nos. 416–21; 422–26 "Charred."	No. 403 Sandstone piece.

Of the rest medium-sized pointed, triangular curved blades, Nos. 380, 387 have a sharp point; whereas No. 385 seems to be intentionally chipped into an elongated point for the purpose of drilling etc. There is nothing particular to note in others.

Potsherds : Only two tiny pieces were found. Nos. 402, 404 seem to belong to one type, as both have dull brown surface, bearing an incision mark and a comparatively smooth underside, and blackish core. Even if hand-made they indicate good pottery.

Bone Splinters : Numerous tiny as well a few large fossilized bone fragments were found. These can be classified into three groups: (a) Small tiny fragments, with clean facets, indicating intentional cutting. (b) Small tiny pieces, Nos. 413–15, with a nib-like point, having rounded corners. These, as well as group (a) when first found struck the writer as rather unusual. He took them to be bone implements, obviously in imitation of the microliths. This view was confirmed by Dr. KURULKAR.[79]

Anyhow numerous fragments, some of them "charred", Nos. 416–26, leave no doubt that the microlithic people at Langhnaj used bones.

D–4

Micros : This proved to be the richest level at Langhnaj, both quantitively and qualitatively. Microliths were numerous, varied and fine.

Many cores were found, though none of them is distinctive. Among scrapers, there are both large and small types. Of the former Nos. 458 and 460 are good specimens; in the latter Nos. 465–68.

Among blades, No. 474, is the finest specimen of thin, two-edged, razor-like blades.[80] It is about 2 inches in length, thin, slightly curved on one side, with a low mid-ridge on the upper surface, and has extremely sharp straight edges. In its present shape, it is partly broken, at both ends.

Crescent blades are many, some offering beautiful examples of the type. The finest, an inch in length, is No. 480[81]. The smaller ones are also pretty, the one resembling the large one is No. 489.

Among the pointed triangular specimens, No. 496[82], though rather thick, is a well-chipped piece, with a sloping butt-end, which might have been hafted in a spear or an arrow.

The thin, broad or narrow blades are also good. Disc-like pieces or "core trimmings" reappear, of which the finest is No. 505.[83]

Potsherds : Only two tiny pieces were found. It is difficult to say whether they are wheel-or hand-made. Externally No. 521 seems to represent good smooth-surfaced pottery, though not well-fired, for its core is smoky.

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79 For a detailed discussion and full description of these tools see below Chapter IV B, and Plates XIX and XXIX (b).

80 See Plate XVIII (a17), and XXXI(7).

81 See Pl. XVII (19) and Pl. XXX (22).

82 *Ibid* (33) and (12).

83 See Plate XVIII (a15) and XXXI(8).

LANGHNAJ EXCAVATIONS

MOUND II PIT I

D 4 (3 feet to 4 feet)

Micros	Potsherds	Bone Splinters	Stone Pieces	Kanker etc.	Shells
Nos. 427–520 selected (over 200 rejected) The selected pieces include:- (i) (a) Cores (large) : Nos. 426–29 (b) Flake cores : Nos. 430–39 (c) Non-descript : Nos. 440–56 (ii) Flakes (blades ?) (a) Long, two-edged : No. 474 (b) Rectangular, thin, ffat, broad or narrow: Nos. 506–20 (c) Crescentic, large and small : Nos. 475–83; 484–95 (iii) Flakes, scrapers (?) Large and small : Nos. 457–60, 461–73 (iv) Flakes (points ?) Large and small : Nos. 496–98; 499–502 (v) Small disc-like pellets: Nos. 503–05.	Nos. 521–22 No. 521 is entirely brownish No. 552 has a brownish surface, but is blackish inside	(i) Nos. 534–36 Large, charred pieces of bone. (ii) Nos. 537–63 : small, charred pieces of bone. (iii) Nos. 564–69 : Medium sized unburnt fossilized bones. (iv) Nos. 570–72 : Nails and a tiny skeleton (v) Nos. 573–621 : small fragments (vi) Nos. 622–29 : Bone Tools (?) (vii) No. 630 "cardamom"–like bone (viii) No. 631 : Large piece of bone photographed *in situ* (ix) No. 632 : Medium-sized fossilized bones (in a tin).	Nos. 523–33 These include :— (i) Quartzite pieces. Nos. 523-28, 531-33 (ii) Cherty agate(?) (iii) Red ochre or Iron oxide. Nos. 530–533	No. 633	Nos. 634 (packet of 2 "conical") gastropod shells No. 635 1 spiral(Helix) No. 636 Fragments of large lustrous shell (Unio . Bivalve or Lamillibranch)

Stones : A number of quartzite, a couple of nodules of iron-oxide, and a large nodule of agate (?) with an yellow coating were found. The existence of quartzite pieces imply the use of these stones by the microlithic people, as mentioned before. Further proof of this is afforded by No. 525 among these finds. It is almost rectangular, of fine grained, brown quartzite with well-cut sides, and has a bulb of percussion on the lower side, now covered by carbonate of lime and clay. Another piece, No. 527, seems to be part of a thick narrow triangular blade. The iron-oxide-like pieces, Nos. 530,533 are really kankar containing sub-angular fragments of chalcedony, and angularly distributed particles of iron ochre or ore.

Bone Splinters : Finds of these, as the classification overleaf shows are not only plentiful but varied. Besides "charred" and uncharred fossilized bone pieces, a few tool-like, a number of large completely fossilized pieces, and one very large piece were unearthed. These leave no doubt whatsoever of the ossiferous nature of this mound, and its contemporaneity with and the probable use of bones by the people living on the site.

Shells : Specimens of three kinds of shells, "conical", fresh water gastropod, "spiral" (Helix) and large lustrous variety (Unio Bivalve or Lamillibranch) were found.

D–5

Micros : The number of micros suddenly diminishes in quantity as well as in quality. Among the finds, the best are scrapers, of which No. 642 is of quartzite, chipped all round; No. 646, a small U-shaped piece, shows definite signs of use, by its blunted, bevelled edge, specially on the undersurface.

The two long blades are good specimens of the type; among crescents, the finest is a tiny piece No. 665, of black chert. It has a sharp edge and point.

Bone Splinters : There is nothing particular to note in bone fragments. Their full classification is given overleaf. So also of shells.

Large quartzite pieces are absent, as also large pieces of bone. These point to the fact that important period of occupation (?) was during the "formation" of layer 4.

D–6

There is nothing to comment on the bone finds from this level.

Micros : Majority of these are very small, mostly of quartz and chalcedony. Among these, a tiny pointed triangular find No. 683, has an exceptionally fine, sharp point, and the butt-end has a slope so that it could be hafted. The find would make an excellent arrow-head. No. 682, is a disc-like tiny scraper, less than an inch in diameter.

Kankar and Shells : These appear in larger quantities now.

D–7, 8 and 9

Micros : These are found up to 9 feet. But whereas only 5 pieces were found between 6 and 7 feet, 9 pieces were found in the next, and only two between 8 and 9 feet, and none at all between 9 and 10 feet. Almost till the end delicately worked finds occur as shown by the specimens

LANGHNAJ EXCAVATIONS

Mound II Pit I

D 5 (4 feet to 5 feet)

Micros	Potsherds	Bone Fragments	Stone Pieces	Kankar	Shells
Nos. 637–66 These include :— (i) Cores (a) Nos. 638–40 (b) Flake cores : Nos. 637, 645–47 (ii) Flakes (blades ?) (a) Thick, slightly curved, No. 641 (b) Thin, flat, narrow : Nos. 654–55, 662–63 (c) Crescentic : Nos. 656–61 664–65 (iii) Flakes (scrapers ?) Rectangular or rounded : Nos. 642–45, 648–53	Nil.	(i) No. 666 fossilized, some "charred" (ii) No. 667 "charred", fragments (iii) No. 667A : Tools (?) (iv) No. 668 Large packet of fossilized pieces (v) No. 669 Tiny fractures (vi) No. 669A Tools (?) (vii) No. 673 Fcssilized pieces	Nil.		I No. 670 (numerous conical) gastropod II No. 671 Two pieces of large, lustrous variety (Unio Bivalve Lamillibranch) III No. 672 Two spiral (Helix)

LANGHNAJ EXCAVATIONS

MOUND II PIT I

Micros	Bone Fragments	Shells	Kankar
D 6 (5 feet to 6 feet)			
Nos. 674–91: These include :— (i) Flake Cores: Nos. 674, 676. (ii) Blades (?) (a) Thick, rough: Nos. 677–80. (b) Small, tiny, thin: Nos. 681, 685–89, 691. (iii) Flake (scrapers ?) No. 675. (iv) Flake (Points ?) Nos. 683–84, 690. (v) Small disc-like pellet, No. 682.	(i) No. 692 fossilized. (ii) No. 693 "charred", pieces. (iii) No, 694 Tiny fractures. (iv) No. 695 Tools. (v) No. 696 "Impressed"-like piece. (vi) No. 697 Medium-sized pieces.	No. 698 Gastropod (about 25)	No. 699.
D 7 (6 feet to 7 feet)			
Nos. 700–704. Blades (i) part of No. 702 is long blade. (b) crescentic: Nos. 700, 701. (ii) Points, No. 704.	No. 705. Three fossilized pieces.	No. 706 Gastropod	No. 707.
D 8 (7 feet to 8 feet)			
Nos. 708–715. (i) Flake (blades ?) (a) Medium, two-edged, No. 708. (b) Tiny: Nos. 710–11. (ii) Flake (scraper): No. 709. (iii) Flakes (points): Nos. 712–14. (iv) Disc-like: No. 715.	No. 716 two pieces. 716a blackish, tool-like.		
D 9 (8 feet to 9 feet)			
Nos. 717, 718 : Scraper (?) : No. 717. Blade (?) : No. 718.	No. 719 : Bone fragments.		

from these levels, and particularly by No. 715 from D 8, a well-trimmed tiny disc-like object, and a blade No. 718 from D 9.

Bone Splinters : These occur up to 9 feet, though in a much smaller quantity. No. 716 (a) from D 9 is tool-like with facets.

Shells : These diminish in quantity at D 7, and disappear afterwards. Kankar is the only thing found after D 9.

Mound II, Pit II

Since a number of surface finds were collected from the sloping ground, on the right of Pit I, another pit, called Pit II, was dug at a distance of about 20 feet from Pit I, to see whether these were merely surface finds, washed on to the slope, or whether they could be found deeper beneath the surface soil.

The analysis and the discussion below will show the relative position of the finds, and their importance.

D-1

Micros : There is no real core. All are flake cores. Among these, the finest is No. 725. It has a bulb of percussion, faceted platform, and bevelled, well trimmed sides on its upper surface. The rest of the upper surface has the cortex. It could have served the purpose of a scraper.

Similar but much smaller are disc-like pieces or "core trimmings", No. 737 and No. 740-41. The two latter are more or less rectangular, tiny, less than ½ inch, but well-trimmed over. No. 741 has a sharp edge on one end.

Among points, No. 739 deserves notice. Its pointed end is definitely, worked, whereas the irregular but flat butt-end seems to suggest that it was so made for hafting. If so, this would be a definite instance of an arrow-head.

Potsherds: As the classified list shows at least 6 sub-types of pot-sherds were found. Some of these, as No. 760, a rimmed piece of black ware, have a fine texture and are definitely wheel-made. Along with these we do find crude hand-made pottery as No. 761-63 or No. 764. The former has a red slip on the inner and outer surface, whereas the core is smoky. Nos. 765, 767 are very coarse on one side, but smooth on the other.

A brick-bat is also found. If this piece were to be considered recent –say 100 years old–it would not be wrong to say that owing to the sloping surface later and earlier things have got mixed up at this spot.

Along with this were also found small lumps of ferruginous limonite coated sand.

Bone Splinters: This is also evident from the fact that numerous bone fragments, of all types—fossil, "charred" and uncharred, some tool-like, together with a tooth are found so early in the 1st foot.

It appears that owing to the erosion of the hill-side and the rewash collecting at the spot, this mixture has resulted.

LANGHNAJ EXCAVATIONS

MOUND II PIT II

D 1 (0 foot to 1 foot)

Micros	Potsherds	Terracotta	Bone Pieces	Shells	Kankar
Nos. 719–758 selected (about 50 rejected). The selected specimens include:— (i) Core flakes Nos. 719–726. (ii) Flake (blades ?) (a) Long-medium, flat : Nos. 728–31. (b) Long-medium, thick and ridged: No. 727, 732–34, 739. (c) Crescentic: Nos. 746–753, 755. (iii) Flakes (scrapers ?)— (a) Small, flat roundish : Nos. 735–738. (b) Small, flat, thin, rectangular: Nos. 742–45, 754. (iv) Flakes (points ?)— Thick and pointed : Nos. 756–59. (v) Trimmed tiny pieces; long (not round as usual): Nos. 740–41.	Nos. 760–776 These include:— (i) (a) Thick, coarse, bright red: Nos. 761–63. (b) Thin, smooth, brown: Nos. 765, 767. (c) Thick, coarse, bright red on face, dull brown inside : Nos. 766, 769 770, 773. (d) Medium, very coarse, bright red: Nos. 768, 775. (ii) (a) Thick to medium, smooth, black:- No. 760, 771–72, 774, 776. (b) Thick, very coarse, black, No. 764.	No. 777 (brick-bats bright red) Nos. 778–80 Ferruginous yellow brown limonite coated sand.	No. 782 (a packet of 6 pieces) No. 783 (a packet of smaller pieces) No- 784 (some pointed tool-like; also a tooth). No. 785 (Pointed, faceted tool-like). No. 786 (Tiny pieces). No. 787 ("charred"). No. 788 (Large bone pieces).	No. 789 "conical" fresh water gastropod.	No. 790.

D–2

Micros: The number of micros at this level were comparatively few. Among core-flakes No. 795, a piece of reddish chert, is a fine specimen, trimmed on one fourth of the upper surface.

Nos. 811–12: the former rather irregularly flaked is an undoubted specimen of a crescent shaped blade, while the latter has a regular sharp edge.

Among points No. 814 is a similar tiny specimen, whereas No. 815 has a thin body and very elongated point.

Potsherds: Two tiny pieces of good, black ware were found. One of them, No. 817, has parallel curved incised lines on one surface.

Bone Splinters: Numerous fragments were found: fossil, "charred" and uncharred, as well as a few so well faceted as to look like tools.

Kankar and shell begin to appear in larger numbers.

Quartzite Pieces: A number of large pieces of these stones as well as a few among microlithic finds show that these were used.

D–3

Micros: Among cores, a few are genuine cores; some of them are of quartzite. Of the flake-cores, No. 838 is a fine specimen, trimmed all over the upper surface. No. 840 is similar. No. 837 is a specimen of a small, long (or rectangular) core-like blade, having a bevelled trimmed upper surface. The undersurface is comparatively flat.

In the third group of roundish or rectangular flakes No. 843 is heart-shaped, sloping towards the rounded point on the upper surface; No. 846 is rounded at the butt-end and sharply pointed, and otherwise well-flaked on the upper surface. In group five, No. 854 is one of the few discoids found so far in this pit.

Both the long blades Nos. 868–869 have a sharp edged side; the former has a good appearance also.

Among the points, mention should be made of Nos. 870, 871, 876[84] and 877. All these could be good arrow-heads.

Potsherds: A few pieces were found. No. 884, if it really belongs to this level, that is not washed on to this plane, is indeed a problematic piece. For it has a fine, almost polished red surface on one side; the texture though otherwise blackish, is fine. Other pieces are probably of hand-made pottery as their texture and coarse appearance suggest.

Yellow ochre: Yellow ochre-like lumps of limonite coated sand occur once again in this Pit.

Of interest would be Nos. 892, 893, 900, which look like lumps of lime stone and lime and gravel plaster–particularly the last two. For these lumps are so well smoothened into a flat surface on one side as to suggest that they had been used for some purpose either as wall plaster or otherwise. However their examination revealed that these lumps were nothing but ordinary lumps of gravel.

Bone Splinters: The usual variety of bone fragments is found in this layer. Noticeable are the finds of a large tooth, and "charred" pieces; some of them look like tools. Tools also occur.

84 See Pl. XVII (34) and Pl. XXX(8).

LANGHNAJ EXCAVATIONS

Mound II Pit II

D 2 (1 foot to 2 feet)

Micros	Potsherds	Bone Splinters	Stone Pieces	Shells	Kankar
Nos. 791–816 selected (about 25 rejected). (i) Core flakes: Nos. 791–796 (ii) Flakes (blades?) (a) small, rectangular: No. 807 (b) short, flat, thin, slightly ridged: Nos. 808–10, 813 (c) crescentic: Nos. 811–12 (iii) Flakes (scrapers ?) : Large and medium : Nos. 798–804 (iv) Flakes (points ?) Nos. 805, 814–16	(i) Medium, black, incised lines on face; No. 817. (ii) A tiny piece: No. 818.	No. 819 (A packet of large pieces of fossilized bones) No 820 A small packet of several faceted and pointed tool-like pieces No. 821 "charred" pieces	Nos. 824–830 Except Nos. 825, 826 all are varieties of quartzite	No. 822–spiral (Helix), "conical" (fresh water gastropod) and a piece of large shining shell (Unio Bivalve or Lamillibranch)	No. 823

LANGHNAJ EXCAVATIONS

Mound II Pit II

D 3 (2 feet to 3 feet)

Micros	Potsherds	Bone Splinters	Shells	Miscellaneous
No. 831-882 selected (some 40 rejected) (i) (a) Cores: Nos. 831, 835, 839 (b) Flake Cores: Nos. 832-34 836-40 (ii) Flake (blades?) (a) Medium, thin, narrow : Nos. 868-69, 872 (b) Crescents: Nos. 866-67, 873 (iii) Flakes (scrapers?) Round or Rectangular: Nos. 841-51 (No. 845 pointed) (iv) Flakes (points?): Nos. 870-71, 874-78, 881 (v) Small Disc-like: Nos. 852-65, 879-80, 882	Nos. 884-888 (i) (a) Thin, smooth, red No. 884 (Cf. Nos. 768 of D 1) (b) Thinner Nos. 885, 888, (Similar to No. 766 of D 1) (ii) (a) Medium, coarse, blackish, No. 883 (b) Thin, coarse, black Nos. 887-88	(i) No. 894 (A packet of big pieces of fossilized bones): (ii) No. 895 Bone Tool (?) (iii) No. 896 "charred" bone pieces. Some Tool-like. (ix) No. 897 A Thin bone piece with a hole in the middle. (v) No. 897A Tooth (?)	No. 898-898A "conical" fresh water gastropod and spiral (Helix) No. 898A piece of a bright lustrous shell piece (Lamilli-branch or Unio)	Nos. 889-91 : Small lump of yellow ochre-like limonite coated sand. Lumps of gravel Nos. 892, 893, 900

D–4

Micros: Among the few micros, only two need be noted. No. 908, a sharp-pointed flake, which could be used as a scraper as well as a point. The second is 904, a crescent blade, sharp-edged and pointed on both ends.

Bone Splinters: In bone fragments, No. 917A comprises a number of tiny, or a little larger specimens which are beautifully faceted or pointed or both. We have here rectangular blades, one end of which is made into a broad sloping chisel-like edge. There are at least three like these. Then there are points whose sides are more or less rounded and others with small points, faceted sides and steeply sloping ends. The rest have merely faceted sides.

D–5

Micros: Among flakes, No. 928 is a well trimmed blade, having a neat parallel flaking in the centre of its upper surface. No 932 is again a small disc-like piece flaked all over the upper surface, while the underside has a clean flaked surface. The two crescent blades are also good, particularly No. 934[85].

All the finds are heavily encrustated by a film of calcerous clay.

85 See Pl. XVII (18).

LANGHNAJ EXCAVATIONS

Mound II Pit II

D 4 (3 feet to 4 feet)

Micros	Bone Splinters	Shells
Nos. 901–915 These include:— (i) Core : No. 902 (ii) Flakes (blades ?) (a) Large or medium and small : Nos. 904–907, 911–913 (b) Crescents : Nos. 909, 912 (iii) Flakes (points ?) : Nos. 908, 911, 915	No. 916 Fossilized No. 917 Several small pieces pointed or faceted or both. Some "charred"	No. 919 : pieces of white lustrous shell (Lamilli-branch or Unio)

D 5 (4 feet to 5 feet)

		Kankar
Nos. 920–942 (a few rejected). These include :— (i) Rough cores : Nos. 920–22 (a) Core flakes : Nos. 923–24 (ii) Flakes (blades ?) (a) Medium, or small, rectangular, flat : Nos. 928, 933, 936–39, 942 (b) Crescents : Nos. 934, 940 (iii) Flakes (scrapers ?) : Nos. 925–27, 929–30 (iv) Points (?) : Nos. 935, 939, 941 (v) Disc-like : Nos. 931–32	No. 943 (Two small bone pieces)	No. 944

CHAPTER IV

GUJARAT PALAEOLITHIC & MICROLITHIC CULTURES IN RELATION TO SIMILAR CULTURES IN & OUTSIDE INDIA

PART I

PALAEOLITHIC CULTURE

Evidence from the explored areas in India is too meagre and the gaps between the explored areas so vast that it is not possible to draw definite inferences from a comparative study of palaeolithic industries of Gujarat and other regions. What is intended is a study which will enable us to know the relative position of the Gujarat finds.

Such a comparative study would yield more tangible results, were it possible to correlate the stratigraphical position of finds from different regions. Under these limitations the comparision can be mainly typological, though wherever the stratigraphy is definitely known it will be indicated.

For a comparative study, it is necessary to keep before us the chief features of the Gujarat industry.

Chief features of Gujarat Industry

The finds were made in two river valleys—the Sabarmati in Northern Gujarat and the Orsang in Central Gujarat. In the former the most important site was Pedhamli, almost midway on the central reaches, with Hadol in the north, and Ghadhara, Hirpura and Warsora in the south.

At Hadol the finds were made

(i) at the junction of gravel and granite

(ii) in the gravel conglomerate

and (iii) on the granite or gravel surface (exposed).

The tools—ovate and sub-triangular hand axes, cleavers and discoids, pebble tools and flakes—were all of quartzite, some rolled and the rest fresh. They were divisible into

(a) Tools with irregular outline, rough 'step' flaking and pebble cortex at the butt-end, or over part of both the surfaces.

(b) Tools with regular outline, wavy edge, comparatively smooth 'step' flaking, and no pebble cortex or the cortex patch at a definite place.

This "inferior" and "superior" workmanship in finds did not correspond with the various strata in which they were found, but was noticed in a mixed state even in the lowest stratum.

At Pedhamli the finds were made at 4 localities. Every where

(i) in the gravel conglomerate,

(ii) at the junction of gravel conglomerate and reddish silt, and

(iii) in the reddish silt at various depths.

The finds with the exception of two or three were all of different kinds of quartzite, and mostly fresh, a few being partially rolled, and much rolled. The industry included a large number of hand axes with various sub-types, a few real cleavers and discoids, pebble-tools and Levallois-like and ordinary flakes.

The finds from each stratum were divisible into at least two groups: "inferior" and "superior" as at Hadol. However, the almost perfectly shaped cleavers, ovate and pear-shaped hand axes were found from the upper alluvium. But considering all the finds from the three strata it may be said that at Pedhamli a mixture of "inferior" and "superior" forms is visible right from the lowest stratum, with a slight improvement in workmanship as we ascend higher, the acme being reached in the three finds from the upper alluvium.

Similar mixture is noticeable in the finds from Ghadhara, which were mainly from the blackish hardened conglomerate. The really important finds are a few ovate and other hand axes and a cleaver, with no discoids or pebble tools.

Hirpura, Kot and Warsora yielded not more than three or four finds each. But all these are fresh, from the gravel conglomerate, and consist of fine Levallois-like flakes and rather crude cleavers. This evidence, though so little, corroborates the evidence of a mixed palaeolithic industry from the sites on the upper reaches.

Nothing definite can be said about the Sabarmati flake industry because the specimens are so few.[1] Of the two good flakes from the gravel at Pedhamli No. 147 has faceted striking platform; the other has one-faced platform. Thus leaving aside the question of 120° or obtuse angle, the flakes look Levallois-like in technique. From the gravel–alluviam junction, out of the 7 specimens, three have got a very prominent bulb on the undersurface, but no clearly marked striking platform. In all of these, Nos. 164,165 and 241 and 159, the striking platform forms an obtuse angle with the plain of fracture. Hence they may be called Clactonian in technique. The rest are really nondescript and hence called ordinary.

The two flakes Nos. 2 and 7 from the gravel at Kot and Hirpura respectively have a similar prominent bulb, but have a good striking platform, though obtuse-angled, so they may be called typologically Clactonian–Levalloisian.

Of the flakes from the alluvium at Pedhamli Nos. 113, 123 and 182 have a prominent bulb, and a clean faced striking platform—which may or may not be prepared—all obtuse-angled. Hence the flakes may be called Clactonian-like. Most interesting is No. 192. It has an erased bulb, clean faced striking platform and almost levelled upper surfaces and marks of retouch or use on the edges, which make it look a Levalloisian or Mousterian-like flake. Similar is the case with No. 245, a point-like flake from Warsora. The available evidence points to Clactonian-Levalloisian-like features.

The finds in the Orsang valley were made almost all in one locality, on the right bank to the north of Bahadarpur, their stratigraphic position being the top of the loose gravel, or the talus. Some finds are of quartz, some of quartzite, which is however different from that of the Sabarmati. Unlike the

1 Hence they are left out from the typological comparison.

Sabarmati finds a majority of the Orsang finds are rolled or semi-rolled and a few fresh ones. These latter however are among the finest specimens recovered, though made of quartz, a more intractable material than quartzite. The implements have a neat regular outline, and beautifully flaked body, so well as to suggest pressure flaking. Their stratigraphical position, though not so well fixed as that of many Sabarmati finds, being picked up from the top of loose gravel, indicates that they may at least be placed at the junction of the gravel and upper stratum of alluvium if not in the gravel itself.

Thus even in the Orsang valley a high degree of perfection in flaking technique was reached by the time of the gravel deposition.[2] A conclusion, though on much slender evidence, is corroborated by similar stages in the Sabarmati valley.

We can now embark upon a comparative study.

The region of the Sabarmati and the Orsang almost continues the traditional dividing line which cuts India into two: (1) North of the Vindhyas and (2) South of the Vindhyas. Comparatively little has been done in prehistoric studies in North India, except for the work done by the Yale-Cambridge Expedition in south-western Kashmir and the Punjab. A vast unexplored tract intervenes between this region and Gujarat.

Punjab

The Punjab palaeolithic industries were obtained from the terraces on the Indus, the Soan and other rivers. The earliest artifacts are large massive flakes extracted from the Boulder Conglomerate of the second glacial period. Typologically there are no tools from the Sabarmati to compare with these.

Less old than the Boulder Conglomerate flakes are the pebble tools, cores and flakes from the terraces T_0 and T_1 (of the 2nd interglacial period) on the various sites on the Indus. These are called "The Early Soan" Tools. A few of the Sabarmati pebble and flake tools could be compared with some of the forms of pebble tools and flakes of the Early Soan. But there are two important differences. First, the Early Soan tools fall into three groups of

(i) deeply patinated, heavily worn,
(ii) deeply patinated, but less worn, and
(iii) less patinated, and slightly worn or not at all,

whereas the Sabarmati pebble tools are not so much patinated, and not worn.

The second difference is that very few of the Sabarmati pebble tools show any definite subsequent signs of chipping, after they were naturally broken, as do the specimens of the Early Soan illustrated and described by PATERSON. Hence though almost all the forms of the Early Soan can be found in the Sabarmati, only those of the latter are selected for comparison with the former which are definitely regarded as tools.

Typologically No. 8 from Hirpura, but much more No. 283, a pebble tool from the bed of the Mahi, resembles the Rounded Pebble Tool,[3] (perhaps identical with or similar to the one from Dalwal T_1 —T_2 on the Indus and

2 FOOTE considered the Sābarmati, because of its deeply eroded valley as the oldest river in Gujarat. *GBS*., p. 93–94.

3 De TERRA and PATERSON, *op. cit*., pl. XXXV, No. 7.

now in the Madras Museum), so "flaked from one surface at one on opposite sides as to produce a point"[4]

No. 18 from Hirpura resembles No. 4 "an elongated oval pebble with flat cleavage or flake surface on the lower side and may have flake, struck upward from this side along this direction on one side".[5]

Fairly large chips, convex at the butt-end with pebble cortexed rim, and having straight cleaver-like edges from Pedhamli, can be compared with similar specimens from Kallar on the Indus belonging to the Boulder Conglomerate horizon, and now in the Madras Museum. Likewise one or two specimens from Khusalgarh, probably choppers, resemble Gujarat specimens in having either a naturally flat base, or slightly flaked, pebble butt end rudely chipped surfaces by rough 'step' technique.

The Early Soan discoidal core No. 2[6] with a similar tool from Hadol, No. 265, "both having a patch of ''cortex' remaining in the centre of one or both surfaces".[7]

Likewise another core from Hadol No. 269 can be compared with Nos. 2, 5 or 6 of the Late Soan cores.[8]

Of the Late Soan A and B, flakes Nos. 6 and 7 and even 2[9] may be compared with Nos. 259 and 267 from Hadol; No. 1[10] with No. 123 from Pedhamli. No. 11[11] has an almost exact parallel in No. 192 from Pedhamli (river bed).

The Sabarmati however has hardly any flake with parallel flake scars.

But the greatest resemblance is noticed between cores, blade-like flakes and hand axes from Chauntra (whence a mixed industry consisting of Early Soan tools and Acheulean hand axes was found from a gravel that may be of the 3rd glacial age) and those from the Sabarmati and the Orsang.

The Chauntra pointed ovate hand axe[12] has a number of parallels from Ghadhada (No. 25), from Pedhamli, and from Hadol (No. 263); its "pyriform" hand axe[13] with No. 144 from Pedhamli II and with No. 295 from Bahadarpur on the Orsang.

Its flake with regular convergent primary flaking[14] with cores similarly flaked from Pedhamli, and Bahadarpur (No. 311) and a flake No. 259 and No. 267 from Hadol.

The Chauntra-like long blade is also found in the few blades from Pedhamli gravel Junction (No. 161) and from the reddish silt (Nos. 162,54,182).

4 *Ibid.*, p. 306.
5 *Ibid.*, pl. XXXIV.
6 *Ibid.*, pl. XXXVI
7 *Ibid.*, p. 307
8 *Ibid.*, p. 309, IV, pl. XL.
9 *Ibid.*, pl. XLII
10 *Ibid.*, pl. XLII
11 *Ibid.*, pl. XLI
12 *Ibid.*, pl. XLIII, No. 5
13 *Ibid.*, No. 4
14 *Ibid.*, pl. XLIII, No. 2

Rajputana, Central India and Central Provinces

After the Punjab come Rajputana and parts of Central India and the Central Provinces where stray, mostly surface finds have been made.

Of these three hand axes, first a small pointed ovate or pyriform from Bundi[15], then an ovoid and a truncated ovate, both from Jaipur[16] have similarity of shape respectively with Nos. 144, 138 and 66a from the Sabarmati.

Likewise the pear-shaped hand axe from Burdhana[17], Saugar District, Central Provinces and No. 8[18], also from C. P., evidently a U-shaped cleaver, correspond with Nos. P. 74 and PT. 224 from Pedhamli III. Similarly a sandstone cleaver[19] from Bundelkhand, Central India has a corresponding specimen in No. 195 from the gravel at Pedhamli.

Hyderabad

Further east a few finds have been reported from Bengal, Bihar and Orissa[20], from Paloncha[21], on the eastern outskirts of the Hyderabad State, and the Hyderabad State itself.[22] Of these many of the Paloncha specimens, particularly the pointed and truncated ovate hand axes[23] bear resemblance to those of Gujarat. The Hyderabad specimen is only one—an ovate of grey silicious lime-stone. So far Bengal had given few palaeoliths, but recently discovery of a large number has been made at Kuliyana, Mayurbhanj State, Bengal.[24] Since no illustrations have been so far published, no comparison with these finds is possible. But the tools are said to be of quartzite and include hand axes, cleavers, scrapers etc.

Narbada Valley

Hence, leaving the Punjab, the second really important region where palaeolithic industries have been discovered is the Narbada valley between Hoshangabad and Narsinghpur in Central India. This region lies almost to the southeast of the Sabarmati, at a distance of about 450 miles, and almost to the east of the Orsang at a distance of 375 miles.

De TERRA's work on behalf of the Expedition above referred to yielded in a sense more important results. Already about 50 years before him a palaeolithic hand axe was found at Bhutara, and fossil fauna supposed to be of the Early or Middle Pleistocene period were observed *in situ* in the Narbada valley. De TERRA's work was a further mile stone. He "succeeded in proving the association of early paleolithic hand ax and flake industries with a middle Pleistocene type of fauna",[25] and the probable relation of these industries with those of the Soan in the north and of Madras in the south.

Palaeolithic finds of a mixed nature were made in various strata.

15 Coggin BROWN, *Catalogue of Prehistoric Antiquities, Indian Museum*, p. 66. pl. V, fig. 3.
16 *Ibid.*, No. 163, pl. V. fig. 6.
17 *Ibid.*, p. 64, pl. IV, fig. 7.
18 *Ibid.*, fig. 8.
19 *Ibid.*, p. 65, pl. IV, fig. 11.
20 *Ibid.*, pp. 67–68.
21 *Ibid.*, p. 59.
22 FOOTE, *Notes on Ages*, p. 122, pl. 2.
23 *Ibid.*, pl. IV, Nos. 4 and 13
24 *Man in India*, XXI. 1941, p. 226.
25 De TERRA and PATERSON, *op. cit.*, p. 313 ff.

In the basal conglomerate of the "Lower Narbada Group" were found industries comprising

(i) large pre-Soan flakes,

(ii) Abbevillian and Acheulian types of hand axes,

(iii) One Acheulian cleaver of amber coloured mottled flint with sharp edges—superficially embedded.

From the overlying red silty clay, fresh Acheulian bifaced and rolled flakes were discovered.

Superimposed over these beds, called the "Lower Narbada Group" but separated by a disconformity, is the "Upper Narbada Group", consisting of basal gravels and sands, overlain by a thick clay bed. In both these strata rolled flakes and cores of early palaeolithic type comprising rolled Acheulian hand axes, large fresh cores of quartzite and trap were noticed. These are supposed to be "contemporaneous with the "Late Soan" tools.

Laterite gravel and laterite soil underlie these three (including the topmost layer of regur) groups.

Comparison with the Sabarmati industry is to some extent possible both stratigraphically and typologically, though the scope for the typologic comparison is very little because hardly any description of the various tools besides their general names are given, and only two types of tools are photographically illustrated. The museums in India also seem to contain only very few specimens of the Narbada tools.

In stratigraphic comparison it is interesting to note that the Narbada laterite bed underlies, as in the Sabarmati valley, the two (implementiferous gravel beds) groups of gravel and silt. The former is considered to be 'a lateritization of the Deccan trap, preceding deposition of river drift and followed by erosion."[26]

The Sabarmati however has not got the two groups of gravel and silt, as the Narbada has.[27] No doubt at Hirpura the gravel bed is split into two–a higher and lower one—by the intrusion of a bluish clay deposit. But this seems to be a local phenomenon. More important however is the fact that so far the Sabarmati gravel and silt strata have not proved to be ossiferous.

Of the six Narbada tools illustrated by De TERRA, two (?) are rolled "Abbevillian" hand axes. Hence detailed comparison with them is out of question. But similar forms, broad ovate and sub-triangular hand axes have been found in the Sabarmati and also in the Orsang. These are Nos. P. 171 (Pedhamli III), 253 (Hadol) and 285 and 296 (Bahadarpur).

The third implement, an "early Soan chopper from basal gravel"[28], has very near parallels both in shape and flaking technique with such choppers, one from the basal gravel and one from the gravel junction in the Sabarmati at Pedhamli. These are respectively No. 243 and No. 172. The

26 *Ibid.*, p. 315.

27 Two gravel beds–one upper and one lower–we also noticed at Bahadarpur on the Orsang, a tributary of the Narbada. But since we did not follow it up till its junction with the latter at Chandod, nothing more can be said about its two gravel beds.

28 De TERRA and PATERSON, *op cit.*, pl. XXXII A, 3.

former of these is much too large; but both have, like the Narbada chopper, a wavy edge, half around the periphery, made by large flake scars, struck perhaps alternately at each side, upwards from the fractured surface—leaving a mass of "cortex" on the rest of the surface.

Of the three "late Acheulian cleavers from clay of the Lower Narbada group"[29] the 2nd and 3rd specimens bear resemblance with similar "cleaver-like" hand axes Nos. 137 and 225 from the gravel junction at Pedhamli and No. 26 from the gravel at Ghadhara.

Since no Narbada hand axes have been illustrated, though frequently mentioned, comparison with them is not possible[30]. The famous Bhutra find, found by HACKETT in the Narbada gravels, a pointed ovate (oval) hand axe, with a neat "symmetrical outline, although rather roughly chipped on the faces" can be compared with a couple of such specimens from the Sabarmati and one from the Orsang (No. 295). In particular No. 139 from the gravel at Pedhamli, though perhaps less flaked, is almost identical in shape with the Bhutra specimen.

The Konkan and the Deccan

South of the Vindhyas, after the Narbada valley, the next important region is the Konkan coastal strip and the Deccan plateau. Little work has been done in the latter.[31] In the former "rude" stone implements have been found round about Bombay since the eighties of the last century. Much of the early work is however mere surface collection and not well illustrated;[32] hence of no use for comparative studies. Slight but important is the notice by TODD of palaeolithic industries in the Salsette Island, to the north of Bombay.[33] Here at Borivli, Kandivli, and other suburbs of Bombay, TODD found industries comprising hand axes, cleavers, flakes and blades and microliths. It appears that hand axes and cleavers were found only at Kandivli. Here no less than 6 strata were observed. Scrapers, cores and choppers were found in "Lower Clay" and over its "top" forming the lowest stratum over the rock. Overlying this clay there is a deposit of reddish-brown gravel. In it were found many implements of Chellean and Clactonian types, and on its top, implements of Clactonian type in mint condition, as well as late Acheulean types. Deposits from other upper layers do not concern us. Of these, the tools that recall similar tools from the Sabarmati are ovate hand axes, figs. 7,9 and 16 and the cleaver, fig. 8.

29 *Ibid.*, pl. XXXII, B.

30 The Madras museum has got a few specimens from "localities", 3,4,5,6,8,9,10. These comprise flakes, choppers and hand axes; the last-one from locality 4, and one from locality 10, are ovate in shape but heavily rolled.

31 Primarily because of the geological nature of the country. Recently the writer carried out the survey of a small area on the Godāvari at Niphad. He did not find any heavy tools like hand axes, but small flakes of trap and chalcedony and small core-like pieces of bloodstone and agate. These are comparable to the proto-neolithic tools from the Newer alluvium of the Narbada, though found from the supposedly older gravel. See *Bulletin of the Deccan College Research Institute* IV (1943), No. 3, pp. 186-204.

32 *Journal of the Anthropological Society*, Bombay, II, pp. 75-79; III, pp. 189-97.

33 *Journal of the Royal Anthropological Institute*, LXIX, Pt. ii (1939), pp. 257-72. His earlier article in *Proc. Prehis. Soc., East Anglia*, Vol. 7, Pt. 1, No. 3, pp. 35-42, the writer has been unable to get.

Greater resemblance is however noticeable between a hand axe (whose exact horizon is unfortunately not known) which Dr. A. S. KALAPESI found along with other small finds while showing TODD round the area mentioned above. It is a fresh pear-shaped or ovalish hand axe of brown fine grained quartzite, flaked all over on one side, while on the other a flat sloping "cortex" patch is left towards the butt-end. Flaking is so good that few traces are now left, except on one surface, where the side edge is made by "step" technique. Its symmetrical outline and form, and smooth flaking remind us of a similar hand axe No. P. 71 found from the reddish silt at Pedhamli. The only appreciable difference is that the former has a pebble cortex, the latter none.

Karnatak

Primarily owing to the efforts of FOOTE, Karnatak too has given a glimpse of its palaeolithic industries. Here from the "hard kankar cemented shingle bed" of the Bennihalla, a tributary of the Malaprabha, in the Dharwar District, and then from the......"coarse shingle bed of the Malaprabha" itself in the Bijapur District, FOOTE had extracted a few implements. Some of these have been described by him in his *Notes on Ages*,[34] (but more fully in his *Memoir on the Geology of the South Mahratta Country*)[35] whereas all those sent to Indian Museum have been described by COGGIN BROWN.[36] The specimens in the Madras Museum the writer was able to study. Hence a detailed comparison between these, and those whose illustrations are given by FOOTE and BROWN, and Gujarat finds is attempted.

The Madras Museum has two specimens from Bijapur. No. 2898, a pointed ovate with wavy edge, over 8 inches in length and of buff coloured quartzite resembles a similar implement from South Africa, whereas No. 2896 an ovate hand axe, about $5\frac{1}{2}$ inches in length has a number of parallels in South India and one found by FOOTE from Pedhamli. Cleavers also have been found from the Malaprabha and its tributaries. A number of these are mentioned by Coggin BROWN. Of these Nos. 1 and 9,[37] recall similar small and large cleavers from Pedhamli III, No. 74 and I, No. 195 respectively.

Mysore

FOOTE also found a few palaeoliths in Southern Karnataka, the portion that is now included in the Mysore State. Some he found "scattered on the pale quartzite shingle bed capping the high ground south eastward of the town of Kadur," and also at Nyamti, 16 miles north of Shimoga; others from the laterite debris near the villages of Nidaghatta and Lingadahalli south of Sakrapatna. Two of the latter are of white quartz, all the rest of quartzite[38]. The quartzite specimens are mostly patinated. There are no cleavers, the hand axes are of oval, ovoid, and triangular types. Disc and discoids are also found. Whereas there is general similarity in shape and technique between Gujarat and Mysore palaeoliths the following bear close resemblance to each other.

No. 202 a small pointed ovate hand axe of milky quartz with No. 230 from Pedhamli I.

34 Pp. 130–31.
35 *MGSI.*, XII (These remarks seem to be erroneous, for no description is found in the book).
36 *Op. cit.*, p. 47–57.
37 *Ibid.*, pl. III.
38 FOOTE, *Notes on Ages*, p. 66.

No. 205 a flat broad pointed ovate hand axe of cinnamon brown quartzite with No. 50 of haematite quartzite from Pedhamli III (mostly in shape).

No. 216 a small hand axe with three distinct planes of flaking on the upper surface with No. 132 from Pedhamli II, and one No. 244 from Aglod. The latter is larger in size.

No. 209 a discoid with similar specimens from Pedhamli.

No palaeoliths have been reported from further south on the Malabar coast.

South India

In contrast to these scanty notices of palaeolithic finds on the south-west coast of India, the south-east coast has proved very rich in these finds. Barring the two extremeties, the Tinnevelly District in the extreme south, and the West Godavari District in the north, FOOTE found palaeoliths from all other districts: Madura, Trichinopoly, (Salem excepted), North and South Arcot, Chingleput, Chittur (?), Cuddapah, Anantpur (excepted), Bellary, Nellore, Kurnool, Guntur, and Kistna, of the Madras Presidency. Of these North Arcot, Chingleput, Cuddapah, Bellary and Kurnool districts yielded the largest number.

In the Madura District the finds were collected "from a shingle bed in the alluvium of the Vaigai, on the left bank of the river, immediately north of Madura town[39]"; in the Tanjore District from the "laterite deposit lying to the south-east of Vallam and south-west of Tanjore city"[40]; in the Trichinopoly District from the "the laterite forming the plateau east of Ninniyur, 45 miles north east of Trichinopoly town "[41]; in the Bellary District "on the surface of the shingle fans lying along the foot of the copper mountain south of Bellary town," also from the Halakundi shingle fans and other sites[42]; in the Cuddapah District from "thin spreads of laterite gravel, " Rāyachoti Taluq[43]; in the North Arcot District " in connection with laterite gravels"[44]; in the Chingleput District in the laterite conglomerate at various places[45]; in the Nellore District "mostly washed out of the laterite gravels resting on the gneissic rocks" in the Maneru valley[46]; in the Kurnool District "in the valley of the Khunder near Roodrar in lateritic gravels"[47]; in the Guntur and Kistna District "from the high level gravels" at Ippatam and Oostapalli on the Kistna.[48]

The above review shows that the laterite beds in South-east India are implementiferous. But since FOOTE had not worked out the stratigraphy completely, nor indicated the typological relation between the finds from the laterite gravel and other gravels and the surface, the value of his large number of finds is mainly typological and not so much cultural.

This want has been to some extent supplied by CAMMIADE'S work in the Kurnool and KRISHNASWAMI'S and PATERSON'S work in the Chingleput District. CAMMIADE in collaboration with BURKITT has given a correlation of the sequence of industries and stratigraphy with that of climatic changes in south-east India.

39 *Notes on Ages*, p. 52.
40 *Ibid.*, p. 54.
41 *Ibid.*, p. 55.
42 *Ibid.*, p. 77–78.
43 *Ibid.*, p. 106.
44 *Ibid.*, p. 108.
45 *Ibid.*, p. 109–11.
46 *Ibid.*, p. 112.
47 *Ibid.*, p. 113.
48 *Ibid.*, p. 120–21.

According to these authors[49] the tools can be stratigraphically and typologically divided into 4 main groups which synchronize with two dry periods and semi-humid periods, the first two alternating with two pluvial periods. Tools found in the laterite pebble bed in the Bhavnasi Gravels at Krishnapuram (78° 53′ and 15° 40′),[50] on the western entrance of the Atmakur-Dornala Pass; "in the derived quartzite pebble bed", on the Rālluvāgu at Yerra-konda-palem (79° 10–15′ and 15° 40–45′)[51] on the eastern entrance of the same pass, in "the derived laterite" bed on the bank of the Sagileru, at Giddalur (78° 55′ and 15° 22–23′,[52] near the Nandi-Kanama Pass, and from the upper part of the laterite overlying the gneiss basal bed at Gundla Bhrameshvaram, a little to the south of the Kistna,[53] constitute the earliest series comprising hand axes (of quartzite) rather roughly flaked, slightly rolled, and stained with laterite; whereas tools from the super-imposed layer of red alluvial clay at Krishnapuram constitute the second series comprising mostly flakes, and a few neatly made hand axes (of quartzite, sandstone and chalcedony). Tools of series 3 and 4 comprise microlith-like and microliths respectively.

The work of KRISHNASWAMI and PATERSON has still further advanced our knowledge of the palaeolithic industries in the Chingleput District. The former discovered tools in the prelaterite Boulder Conglomerate at Vadamadurai;[54] whereas the two together[55] observed a system of four terraces in the Korttalaiyar valley, the laterite conglomerate of the Terrace T_2 at Attirampakkam, yielding, as it did to FOOTE, numerous palaeoliths, typologically similar to those from the main detrital laterite overlying the Boulder Conglomerate at Vadamadurai.

According to both these authors, the Boulder Conglomerate tools fall into two series: (i) Early, and (ii) Late. The hand axes and cores of Early type are heavily patinated, very crude and irregular in outline, with rough flaking, with cortex on butt-end often on both faces; those of late type are less patinated, show typologic advance in as much as tools are more regular in form and show beginnings of "step" flaking.[56]

Tools from the upper stratum–laterite gravel–show further advance. They are stained by laterite. The hand axes show more 'step' flaking, which

49 *Antiquity*, 1930, pp. 327–39, pls. I–VI; figs. 1–3.

50 Survey Sheet 1″=1 Mile 57 $\frac{I}{159}$. This and other topographical details have been added by the writer.

51 *Ibid.*, 57 $\frac{M}{2}$. The village could not be located in the map. The river Rālluvāgu is 12 miles to the north-east of Cumbum and 5 miles north of Tarlupādu, a railway station on the M. S. M. Railway.

52 *Ibid.*, 57 $\frac{I}{15}$

53 The village could not be traced in the map.

54 V. D. KRISHNASWAMI, "Prehistoric Man Round Madras,", a reprint from "A Scientific Survey of Madras and Environs," (Indian Academy of Sciences. 1938.) p. 86.

55 *Ibid.*, p. 88.

56 For fuller details see De TERRA and PATERSON, *op. cit.*, p. 328.

is flatter and neater, and the outline more even. Pear and ovate forms are very common. The cores are mainly discoidal, with more regular flaking.[57]

The third group of tools, belonging to a period following .the removal of gravels, is slightly patinated and is not lateritized. Two main types of hand axes are found showing a much more developed technique. (1) Ovates with small, fairly flat 'step' flaking. (2) Long and pointed forms with thick pebble butts, and large but very neat and regular 'free' flaking. The cores are discoidal, flat, oblong etc. with a prepared platform at one or both ends.[58] Only one cleaver was found (by PATERSON) from this stratum, which typologically belongs to this group.[59]

From the basal laterite gravel of Terrace$_2$ at Attirampakkam, PATERSON[60] collected hand axes and numerous cleavers. Both are slightly patinated and made generally on flake, and trimmed by 'step' technique. In the hand-axes pear and tongue shapes are common, with the flake surface partly or wholly trimmed with small flat neat retouch at the edge. Majority of the cleavers are rectangular with the butt-end straight or convex; some are triangular, with the butt-end pointed. The working edge is usually straight and at right angles to the axis of the implement; but sometimes it is oblique, and in a very few cases it is concave or convex.

The technical stages of two series of tools from the Boulder Conglomerate have been described in European terminology as representing the Abbevillian and the earliest Acheulian; that of the tools from the laterite gravel as resembling the middle Acheulian; and that from the layer above laterite as "probably upper Acheulian."

The hand axes and cleavers from the Attirampakkam laterite are considered to be Late Acheulian[61]; according to KRISHNASWAMI[62] Late Acheulean, Micoquian, and Levallosian.

Comparison with Gujarat industries would have been easier and more detailed had KRISHNASWAMI and PATERSON given a catalogue of the finds and illustrated the various types. As it is the former illustrates only typical tools from Terrace$_2$ representing what he calls Industry V, almost all of the "Late Acheulian type; whereas the latter gives no illustration at all. Consequently we can compare only the Sabarmati and the Orsang's chief features with those of the various industries of the Korttailaiyar valley, using KRISHNASWAMI's illustrations wherever possible. With FOOTE's finds the comparison can only be individual.

Kistna and Kurnool Districts

CAMMIADE's finds represent the industries from Kurnool and the Kistna District, almost the northernmost parts of the Madras Presidency. Here the tools from the Bhavnasi gravels of Series I seem on the whole more primitive than those of the Sabarmati though tools of series (a) from Pedhamli and elsewhere are comparatively

57 *Ibid.*, p. 328.
58 *Ibid.*
59 *Ibid.* KRISHNASWAMI also found some, but he gives very few details.
60 *Ibid.*, p. 329.
61 *Ibid.*
62 *Op. cit.*, p. 89.

roughly made, have untrimmed butt-ends and irregular edges; whereas no rostrocarinate form of the types, except perhaps from Padhamli II, No. P. 126, are found in the Sabarmati.

The hand axe No.9[63], from Yerra-Konda-Palem on the Rālluvāgu found in "the derived quartzite bed" and hence probably of Series 1 compares well in form and technique with a similar ovate hand axe from Ghadhara and Hadol, Nos. 25 and 263 respectively. The Sabarmati specimens however have been placed in Series 2 or (b).[64]

Similarly the specimens from Gundla Bhramesvaram,[65], No. 11 an ovate hand axe, and No 12, a sub-triangular hand axe with a straight edge can be compared with No. P. 55, P. 56 Pedhamli I and P. 151 Pedhamli III. One of these, No. 12, because of its thinness, straight edge and symmetrical form, it is said "would be classed Late Acheulian or early Moustarian."[66] On this analogy No. 69 from Pedhamli III (30 feet in reddish silt) could be similarly classed.

Since many tools from Giddālur are illustrated it is possible to pick up many more parallels. Of these the most important is the cleaver[67]. If it shows an almost exact identity in form and technique with similar tools from South Rhodesia, Tabelbala, North Africa, its close similarity with a specimen No. 74 from Pedhamli III (20 feet in reddish silt)[68] and also with the first found by FOOTE from Kot-Sadolia[69] is no less. Even two others from Pedhamli Nos. PT. 198, PT. 224 and one from Hadol No. 261, are very much similar in technique with this one from Giddālur A.

The second most important parallel is No. 9.[70] It is placed in Series I, that is the older and it is a long ovate hand axe and bears the "Victoria West technique." An almost identical form, No. 226a occurs at Pedhamli (20 feet in reddish silt). Both have got a sharp pointed convex end, the other butt-end boldly trimmed, and a deep flake scar, caused by "the removal of a great plunging flake" (?)

Likewise No. 7, Pl. IV, a pointed ovate, and Nos. 3 and 6, Pl. III, a hand axe with a thick narrow elongated point recall respectively similar specimens Nos. 295 (Bahadarpur) and P. 133 from Pedhamli II, and No. 244 from Aglod.[71]

Since the Boulder Conglomerate specimens from Vadamadurai are not at all illustrated, it would appear from their brief descriptive features that on the whole tools of the Early Series must be more crude and primitive than those of the Sabarmati. For one thing they exhibit bold 'free" flaking, whereas the Sabarmati tools, even of Series I, exhibit traces of "step" flaking.

Chingleput District

63 *Antiquity*, 1930, p. 334; pl. I. No. 9.
64 See above, pp. 24, 29, 37.
65 *Antiquity*, *op. cit.*, p. 335; pl. II, Nos. 11–12.
66 *Ibid.*, p. 335.
67 *Ibid*,, fig. 3, 3.
68 Pl. VIII (14–15).
69 FOOTE, *GBS*., pl. V and SANKALIA, *The Glory that was Gurjaradesa*, Part I, (Bharatiya Vidya Bhavan, 1943), fig I A and I B. (where both the faces are given).
70 *Antiquity*, 1930 pp. 336–37, pl. IV, No. 9, Fig. 2.
71 Pl. IX (9–10).

We then have "Late Series" of this group and "Early Series" of group II. Both these show traces of "step" flaking, but the hand axes of group II have ovate and pear-shaped hand axes, with neater outline. These features seem to correspond with similar features of Series I of the Sabarmati; perhaps the group II of Vadamadurai might correspond more with the earlier type of Series II of the Sabarmati.

Vadamadurai Group III, fresh (?), slightly patinated and not lateritized, with its ovate and long pointed forms with pebble butts, with large but very neat regular free flaking, and cores with prepared platforms can be compared with Sabarmati tools of Series II.

Implements from $Terrace_2$ at Attirampakkam are regarded as upper or Late Acheulian. Pear and ovate hand axes, cleavers with straight or oblique edge and rounded or straight butt-ends, all usually flaked by neat, flat, 'step' flaking, and having regular outline have got many parallels from Series II or (b) from the Sabarmati. In particular the pointed ovate "coup de poing" No. 1 (Pl. 2) exactly resembles No. 75 from Pedhamli III, ovate No. 2 (Pl. 3) No. 25 from Ghadhara, whereas the cleaver No. 1 (Pl. 4) a small cleaver No. PT. 224 from Pedhamli.[72]

With FOOTE and other recent collections made in the Madras Museum the comparison can only be with individual types. FOOTE does not illustrate the Madura and Tanjore palaeoliths, nor could the writer trace them in the Museum. The Trichonopoly specimen No. 87, a pointed oval, thick at the butt-end and sloping at the point with steep side flaking resembles No. 252 from Hadol found exposed on the granite; whereas No. 88 resembles the small pointed oval hand axe, No. 75 from Pedhamli III.

FOOTE's Bellary finds comprise hand axes, cleavers, discoids and flakes. These not only include "specimens of all the types recognized in the classical regions of Chingleput and North Arcot regions", but like the latter districts include types found in Gujarat. Thus:

No. 285 a "reniform" specimen, considered "as an abberrant type", with a prominent and high centre, with steeply sloping sides recalls No 28 from Ghadhara.[73]

Nos. 265–304, all hand axes, in shape and technique resemble similar specimens from Gujarat, but not one has a pebble butt, though some have a pebble cortex. No. 294 has got a cleaver edge. But among Nos. 305–13, Nos. 305–309 have got a pebble butt end and remind us in shape and technique the broad-butted pointed ovate and oval specimens from Gujarat. No. 309 is almost identical with No. 53 from Pedhamli III. The flakes, Nos. 295–298, show advanced technique having clean undersurface, and the upper showing parallel and convergent scars by 'step' technique.

The Cuddapah District also yielded hand axes, cleavers, and flakes. Of these No. 2203, a double pointed oval specimen may be compared with a similar but keeled and dull-edged hand axe No. P. 81,82 from Pedhamli III, or a sharp edged but fish-tailed specimen No. 27 from Ghadhara. No. 2203E is a cleaver resembling a similar small specimen from Pedhamli III.

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72 See respectively Pls. X (1), VI (1–5), VIII (13).

73 See Pl. VI (2 and 9) and Pl. XXI (4, 5).

Similarity of finds from the classical district of Chingleput with those of Gujarat has already been dealt with while discussing KRISHNASWAMI's and PATERSON's finds. FOOTE himself had noticed this similarity when he found a cleaver at Kot-Sādolia and called it a "Madras axe type". This is represented by specimens Nos. 2204,7,8 and 9. Hence no detailed comparison is here necessary.

But one general feature of long oval hand axes from North Arcot, Chingleput and Nellore Districts is that on all there is an almost central elevated point, where all flake scars converge. Sometimes there is a mid-rib or ridge on either side, ending in the point. A narrow variety of this FOOTE called "a spear-head type". This is No. 2204-5 from North Arcot. From Gujarat[74] (Pedhamli II) only one No. 132 and No. 244 Aglod (or four including the two on flake, Nos. 178,180) have been found which have a similar rib, and three plains, 2 flaked and 1 natural "cortex" which meet in the centre.

The two others No. 2204-14, 2204-21 from Nellore District correspond respectively with a small cleaver No. PT. 224 from Pedhamli III and small pointed oval hand axes P. No. 230 and 75 respectively from Pedhamli I and III From the Guntur and Kistna Districts FOOTE cites only a few specimens. Those from Guntur, though thought by FOOTE clumsy and rude are not so bad, and compare favourably with the oval hand axes and discoids from Gujarat, particularly No. 2616, a pointed oval hand axe with a pebble butt.

The Madras Museum has besides FOOTE's three other collections. :— MANLEY from Nellore district, DRUMMOND from Giddālur (Kurnool District) and KRISHNASWAMI from Chingleput District. Of these the Manley collection is noticeable for its number of quartz specimens. Some of these closely resemble similar quartz finds from the Orsang valley, whereas other finds comprising ovate and pointed ovate hand axes, pebble butt-end, and otherwise, pebble fractures, discoids and flakes closely resemble the finds from Gujarat. Perhaps the Nellore collection is more varied than that of Gujarat.

Of the quartz specimens, A-3, pointed oval hand axe, flaked all over; N-22, an ovate hand axe, N-25, a flake (blade ?) and Nos. 0-11, a discoid recall respectively Nos. 225, 309 and 311 from Bahadarpur.[75]

Nos. 15-5 a perfectly made pointed oval quartz hand axe; R-18, a hand axe with a mid-ridge in front, and sloping butt-end in two platforms; A-513 small ovate hand axe flaked on both sides by "step" and "free" technique with a perfectly smooth flaked platform on the butt-end, and No. 112-2 a small pointed oval hand axe, with a small patch of pebble cortex at the butt end respectively[76] resemble Nos. -30, 75; 132, 244; and 75 from Pedhamli.

74 See Pl. VIII (8) and Pl. XXI (16,17).

75 Subsequent to writing these paragraphs the writer received a copy of AIYAPPAN's "MANLEY Collection of Stone Age Tools," *MASI.*, No. 68, where he describes these tools on p. 22, 63, and 65. The writer is glad to note that his brief description of the tools noted here tallies with that of Mr. AIYAPPAN's. The various sites in the district have been indicated by letters of the alphabet, and after the letters of the alphabet have been exhausted, by Arabic numerals. These sites are described on pp. 3-10 of the *Memoir.*

76 These tools are described by AIYAPPAN, *Ibid.*, on pp. 81 and 22 (R-18 and 112-2 cannot be traced in the catalogue).

From the illustrations published by AIYAPPAN we may compare further the pear-shaped hand axe A-1[77], the keeled hand axe A-208[78], and the cleaver K-44[79], and the so-called "awl" and graver A-179[80], A-28[81] with similar implements respectively Nos. 51, 82, 198 and 50, 73, 135, 178, 180 from Pedhamli III; whereas the small hand axe a-68[82] may be compared with No. 230 from Pedhamli I.

DRUMMOND'S Giddālur collection from localities 6a, 8, 14 and Dhone consists mostly of flakes. Giddālur 5 has a very fine specimen of a cleaver prepared on a thick flake.

A reference to KRISHNASWAMI'S work and comparison with the published illustrations has already been made. A study of his collection in the Museum showed some more resemblances and also convinced the writer of the fact that while the South Indian palaeolithic industries have got many parallels in the hitherto known specimens from Gujarat, it has many more types than the latter. Unfortunately the finds in the collection are not numbered, so individual comparison is not possible. Hence the comparison will be limited to noticing the similarity in types not mentioned before. One of these is a type, which is pointed at one end like a hand axe, the opposite end having a broad, straight cleaver edge. This may be the "triangular shaped" cleaver of PATERSON, and KRISHNASWAMI'S (No. 2, Pl. 4). Only one specimen of the kind was found in the Sabarmati, viz. No. 253 from Hadol.

Another type is a Micoquian type of hand axe with a thick, heavy butt-end, and a narrow tapering point. It is GK-KO, 22-2-36. Three specimens PK. 179, PK. 181, PK. 184 from Pedhamli I, can be compared with this.

Before embarking upon a typological comparison with palaeolithic industries from Africa, Egypt and Europe, a reference must be made to the recent discoveries of such industries in Burma, Ceylon, Java and China, though detailed comparison is not possible at present, as all the published literature was not available to the writer.

Burma

Researches on Early Man in Burma during the last 10 years, first by T. O. MORRIS and recently (1937-38) by DE TERRA and MOVIUS[83] have produced rather astounding results. This country, which is only a few hundred miles to the north-east of Madras, is shown to possess an industry different from its neighbour across the bay, but similar to the Early Soan of the Punjab and Choukoutien of China. It thus belongs to the Stone Age culture complex of South-east Asia.

The Burmese industry is called Anayathian (after the colloquial Burmese for an Upper Burman). Its specimens were collected from 12 sites on the left bank of the Irrawaddy between Magwe on the south and Nyaungun, near Pagan on the south. The tools are made out of silicified tuff (felsite), fossil

77 *Ibid.*, pl. II (j).
78 *Ibid.*, pl III (d).
79 *Ibid.*, pl. III (j).
80 *Ibid.*, pl. IV (f).
81 *Ibid.*, pl. VI (d).
82 *Ibid.*, pl. VI (k).
83 *Transactions of the American Philosophical Society* (Vol. 32), 1943.

wood and very rarely of quartzite. Generally they are heavily rolled. Typologically they comprise various kinds of choppers and chopping tools on core, including hand-adzes, a few simple flakes and nuclei. But with the exception of two possible hand axes, these as a rule are absent.

Stratigraphic and climatic correlation would divide the Anayathian industry into four periods. Early Anayathian I tools come from the laterite gravel of Terrace$_1$, and the higher slopes of the Pegu Yoma, phases indicating a pluvial period. Early Anayathian II from the eroded Terrace$_2$ and hard cemented ferruginous crust under Terrace$_3$—of a long dry interval. From the next phase—again a pluvial period—which saw the deposition of basal red gravel Early Anayathian tools were found. Terraces$_{3-4}$ respectively of a dry and wet period yielded tools of Late Anayathian I and II types.

In spite of the fact that these Anayathian industries which cover between them the whole Pleistocene period (the Early Anayathian–the Lower and Middle Pleistocene and the Late the remaining) still no clear stages of development corresponding to the Middle Pleistocene of other areas is visible. MOVIUS is therefore compelled to remark that there is a remarkable uniformity throughout the Old Stone Age of Burma.

This study though not directly helpful for the understanding of hand axe culture of India or Gujarat[84] has however shown, as BURKITT remarks[85], that the Soan industry which was so far regarded as intrusive in Northern India would now appear as an outlier from Burma.

Ceylon

Nearly similar theory is propounded by DERANIYAGALA[86] who thinks that the earliest Ratanpura culture phase with its crude stone-axes having no retouch are more akin to the earlier Soan types than to the quartzite hand axes of the Madras Presidency. Since this industry was found associated with the fossil remains of extinct types of animals, hippopotamus and the Anthrocotheriidae, stratigraphically it can be related to the Pinjor zone of the Siwalik and the Tji Djaelong zone in Java. Further data for this culture is being collected[87], and so the theory may be regarded as provisional.

Java and Malay Peninsula

Both palaeontological and palaeolithic evidence has recently come from Java and other parts of the Malay peninsula. More than half of its fossil mammalian genera is found to be common with that of the Narbada and the Siwaliks. Hence it is believed that in late Pliocene and early Pleisotecene times the fauna of Java was composed of indigenous and Siwalik elements.[88]

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84 At the time of writing the above there was nothing to compare typologically from the Sabarmati. But this season (1944–45) an implement was found *in situ* by the writer in the gravel conglomerate blocks at Aglod. This resembles the hand-adze from Burma. Like the latter it is made on a flat, tabular, rectangular pebble of patinated quartzite. It has a convex edge by slight chipping on either side, which is almost at right angles to the long axis of the implement. The other end is sloping and flaked only on the upper surface.

85 *Nature*, September 18, 1943, p. 335.

86 "Some Aspects of the Prehistory of Ceylon" *Spolia Zeylanica*, vol. 23, pt. 2 (1943) p. 93.

87 According to Dr. DERANIYAGALA's letter to the writer.

88 De TERRA in *Early Man*, p. 262.

To this faunistic affinity more colour is lent by KOENINGSWALD's recent discovery.[89] He found at a site near Pajitan, on the south coast of Central Java a few implements in a dry watercourse, most of them lying scattered about in the bed of the river. but some *in situ* in a boulder conglomerate. On geologic grounds he places the conglomerate in the Trinil (Middle Pleistocane) period and compares it to the similar stratum on the Narbada and in Europe.[90]

The tools are made of silicified volcanic rocks, different kinds of silicified limestone and fossilized wood. Those of the first kind are not patinated at all; those of the other kinds have a beautiful dark brown patination over their worked parts. Some specimens are rolled.

The tools comprise "hand axes" with a triangular section, "flakes," "points", "scrapers", "awls" and "blades." On a typologic comparison of these tools with those from Europe, Africa and India KOENINGSWALD considers the hand axes to be "Chellean", the Clactonian influences being visible in certain flake tools.[91] Some of the hand axes reminded KOENINGSWALD of the Madrasian types[92], though the characteristic cleaver of the latter is not so far found in Java. De TERRA[93], on the evidence of flaked pebbles and flakes, seems to regard the culture similar to that of the Choukoutein, the Soan and that of the lowest Narbada horizon. So also MOVIUS[94], who found the collection to consist predominantly of chopping tools of Anayathian type in addition to many cores and flakes. He regards the so-called hand axes as not typical, but to represent a special type of pointed bifacial chopper.

As KOENINGSWALD himself has said further research has still to discover the associated fauna, decide about the horizon or horizons from which the implements are derived, and determine whether a distinction could be made between the "Chellean" and "Clactonian" stage. Till then, we may regard this as a mixed hand axe-flake culture of the Middle Pleistocene period in Java.

If the hand axes of this culture are comparable to those of Madras, these as well as a few discoids and flakes have typological affinities with similar implements from the Sabarmati valley. Thus a short triangular hand axe with a midrib and centrally converging flake scars from Java[95], reminds us of a similar type Nos. P. 128 and 244; so-called "short hand axes[96] with discoids Nos. 169, 170, 269, and 311 (from Bahadarpur); so-called "points"[97], with small ovate

89 "Early Palaeolithic Stone Implements from Java." *Bull. Raffles Museum*, Series B, No. 1, May 1936, pp. 52-60; pls. XLVI-LVII.

90 *Ibid.*, p. 59.

91 *Ibid.*, p. 58.

92 *Ibid.*

93 *Proceedings, American Philosophical Society*, Vol. 77 (1937), p. 305.

94 De TERRA and MOVIUS, *op cit.*, p. 376. MOVIUS has still to admit that even in the Far East such evolution (towards the hand axe industry) was underway. (p. 377).

95 KOENINGSWALD, *op. cit.*, pl. XLIX, 1.

96 *Ibid.* pl. LIII, 3 and 4.

97 *Ibid.*, pl. LIV, 4.

hand axes Nos. 230, and 75; so-called "awls"[98] with a broad pointed hand axe on flake or on a flat pebble No. 50; a "blade"[99] with a similar long blade or flake No. 182.

Were it possible to date even approximately the other stone finds from caves in the Malay Peninsula discovered by COLLINGS[100] and others[101], as well as a large mass of collection from the Kuantan District, Pahang (Malaya)[102], the relation between the stone cultures in Java on the one hand and with India (Madras, Gujarat) could be attempted. For similarities between COLLINGS' cave finds and those from the Sabarmati are also visible.[103]

Typological similarity of South Indian Industries with those from South and North Africa and also probable climatic correlation between these two regions was suggested by BURKITT and CAMMIADE.[104] Further details of this can now be given, because since these authors wrote, results of three archaeological expeditions, one to East Africa[105], second to Uganda and the third to Rhodesia[106]–have been published. In South Africa proper, much work has been done, but the writer has been unable to get any up-to-date work on the subject, so he has used the work by BURKITT.[107]

South Africa

In South Africa two or three chief Lower Palaeolithic industries were recognized, according to the characteristics of an industry from a particular region. The first is the Victoria West Industry, so called after the key site in the talus at the bottom of the hill side,

98 *Ibid.*, pl. LVI, 1 and 3.

99 *Ibid.*, pl. LVII, 1a, 1b.

100 COLLINGS, "Report of an Archaeological Excavation in Kedah, Malay Peninsula." *Bull. Raffles Museum*, Series B, No. 1, 1936, pp. 1–16, where the Gua Debu, Gua Kelawar, and Gua Pulai sites are said to have yielded tools of a palaeolithic aspect.

101 TWEEDIE, "Report on Cave Excavations carried out in Bukit Chintamani, near Bentong, Pahang, (*Ibid.*, pp. 17–26, pl. XX–XXVII,) describes a similar palaeolithic (Hoabinhian) culture, particularly roughly chipped implements without any sign of polishing. (Further CALLANFELS, review, "Melanesoid Civilisations of Eastern Asia" (in the same number of the Journal (pp. 41–51, pls. XLII–XLV) shows that tools of palaeolithic types–some bearing a strong resemblance to the palaeolithic types of Western Europe are occasionally met with, so far on the surface, or in cave shelters in French Indo-China, Siam, the Philippine Islands, Japan, Sumatra, Java, Borneo, Celebes and the Malay Peninsula. From these specimens which are illustrated we may compare the triangular hand axe No. 1a, pl. XLIV with a similar hand axe from Aglod, No. 244. Thus a wide field lies practically unexplored.

102 COLLINGS, *Ibid.*, No. 2,1937, pp. 124–37, where three types of hand axes are described, but unfortunately their exact findspots cannot be located.

103 The site at Choukoutien (Peking District) in China has so far yielded the most and varied evidence of early Stone Age cultures. The geological strata there have been so well studied that scholars have attempted a correlation of the European quaternary and the Chinese physiographic cycles on stratigraphic, lithologic and faunistic data. Being unable to get the works mentioned in the Bibliography, the writer could not add a note on the Gujarat–Choukoutien Stone Age industries.

104 *Antiquity*, 1930, p. 339.

105 LEAKEY, *The Stone Age Cultures of Kenya Colony*, Cambridge, 1931.

106 *JRAI.*, 1931 (LXI), p. 239 and 1936 (LXVI), p. 331.

107 *South Africa's Past in Stone and Paint* (*SPA*), 1928.

near the town of Victoria West in the Karroo. Both its distinct type of tools, one—a beaked type[108], made out of dolerite, looking like a rostro-carinate, having a great flake scar on the undersurface, and a keel ending in the point, on a part of the upper, on the rest often a flat natural surface—and the other a pointed ovate[109] of fine grained quartzite, occur at Pedhamli II. The former however is very rare, so far only one specimen, No. P. 126, is found.[110]

The second Lower Palaeolithic Industry is the Stellenbosch; the chief sites are Stellenbosch and Mossal Bay, a sea port on the south coast. But "the industry has a wide distribution throughout the Union of South Africa as well as Southern Rhodesia." All its three types of tools[111] of fine grained, sand coloured quartzite, 1, a long pear-shaped hand axe; 2, an "ovate" and 3, a cleaver have nearly exact parallels in Nos. 295 (Bahadarpur), and 226a (Pedhamli III) from Gujarat, as they have in similar tools from South Algeria, North Africa.

Gujarat has not yielded so far such fine pointed flakes with faceted striking platforms and hand axes flaked all over with minute resolved flaking as obtained from a site near Glangrey Falls and Fauresmith in the Orange Free State – and attributed to the Middle Palaeolithic Period. But a small triangular flake, "a point" No. 245 from Warsora on the Sabarmati, and the quartz hand axe from Bahadarpur come very near to the specimens illustrated by BURKITT, while the discs[112] and a pebble tool sharpened along one edge – a miniature chopper – all from Glangrey recall similar tools Nos. 311 and 291 from Bahadarpur.

Subsequent to writing this, the writer secured LEAKEY'S small book, *Stone Age Africa* in which the latest position of prehistorical studies in that region is indicated. From it the following brief summary is given to elucidate further the chronological position of the industries mentioned above.

The work of Professor van Riet LOWE, GOODWIN and others proved that the earliest palaeolithic tools are the pre-Chellean pebble tools. These were known before, but were found later by van Riet LOWE *in situ* at River View Estate and elsewhere in the 60-foot terrace of the Vaal River. This pebble culture is placed in the Lower Pleistocene by LEAKEY and may be associated with a wet phase according to van Riet LOWE. Since no illustrations have been seen by the writer, comparison with Gujarat pebble-tools is not possible.

The next or immediate (?) stone-age culture is the Stellenbosch, which is divided into Lower, Middle and Upper. It is the great hand axe culture; the Lower Stellenbosch represented by Chellean types of hand axes and Clactonian-like flakes. The Middle Stellenbosch includes the final stage of the Chellean and earlier Acheulean hand axes as well as cleavers.

The upper Stellenbosch includes a large amount of fine hand axes, cleavers worked on flake, "numbers of detaching hammers and typical Victoria West Cores from which the flakes used for these axes and cleavers were

108 *Ibid.*, p. 55-56, fig.. IV, 3; cf. here Pl. VII (13) and Pl. XXIV (4, 5).
109 *Ibid.*, p. 56, fig. IV, 1.
110 See note 108 above.
111 *Ibid.*, fig. 2, 1; vii, 4 respectively.
112 *Ibid.*, p. 76, fig. xi, 5, 6 and 4 respectively.

struck." These assemblages were found *in situ* in ideal conditions, viz., in definite association with a fossil fauna and in a position which shows clearly their stratigraphical relationship to the next South African culture stage, called the Fauresmith. At both the sites in the Vaal River valley, Sheppard Island, and River View Estates, opposite Windstorton, the implements were found *in situ* in the gravel. Since a large number of flakes and hand axes are prepared by Victoria West technique out of quartzite, it is now held that the technique was neither confined to the Victoria West region nor to the material–dolerite–of which the earlier tools were made, but this particular culture formed part of the Upper Stellenbosch Culture, the technique itself resembling, or the parent of – according to BREUIL – the Levalloisian of Europe.

Though no illustrations can be cited of the cleavers-on-flake of this industry, it must be noted here that all the large Sabarmati cleavers as well as the small Karjan cleavers are made from flakes, on Victoria West technique. Hence the relation with the South African – in fact with the entire African Stone Age industries – may turn out to be more than typological.

The next stone age culture is the Fauresmith, which too is divided into three major divisions, Lower, Middle, and Upper. It was supposed to have a limited distribution and seemed to be confined to an area where lydianite occurred. This view is contested by LEAKEY who said that Acheulean types of hand axes of quartzite comparable in beauty and skill of execution to those of the Fauresmith, were found at Oldoway, East Africa. LOWE supplied evidence for this view when he later found Fauersmith implements of quartzite over many thousands of miles. The same may be said of Gujarat implements, particularly the pointed quartzite hand axe No. 75 from Pedhamli III, and the quartz hand axe No. 295 and blade No. 309 from Bahadarpur. These are comparable in form and technique to the hand axes and a blade of the Fauresmith culture illustrated by LEAKEY.[113]

Rhodesia

The Rhodesian Archaeological Expedition (1929) led by ARMSTRONG worked at two places in Rhodesia. It first excavated the Bambata cave in Matapo Hills, south of Bulawayo. The results were outstanding. The excavation gave "for the first time in South Africa a stratified sequence of cultures from Acheulean to Wilton equivalent of the European Tardenoisian, and established the fact that the sequence was in agreement with that of Europe." Here the Acheulean layer, between 13 feet 6 inches and 16 feet in area 1, and at 16 feet 6 inches in area 2[114], yielded pointed ovates and cleavers[115] of quartz but mostly of brown and green diorite. These remind us of similar tools, cited specifically often before, from Gujarat.

The second site where the Expedition worked was near the Victoria Falls. Its aim was to study tools by excavations of the residual gravel "which occurs in patches upon the old river-bed of the Zambesi as a

113 *Ibid.*, p. 91, fig 12. For those who are further interested may consult the following books cited by LEAKEY.
GOODWIN, A. J. H. *Bantu Studies*, 1935; BREUIL, *L'Anthropologie*, Vol. XI, and *Cahiers d'Art*, Paris 1931, van Riet LOWE, *Nature*, Vol. 135, p. 53 and others.
114 *JRAI.*, LXI, 1931, p. 254–55 and p. 258.
115 *Ibid.*, Fig. 14, p. 271, fig. 15, p. 272.

spread, seldom more than 6 inches in thickness upon hillocks and escarpments." A mixed industry was found, which is classified typologically[116] into Pre-Chellean, Chellean, Acheulean: Phase 1, 2 and 3, Clactonian: Phase 1, 2; Levalloisian, Mousterian, Bambata (= European Aurignacian). In these the cleaver is "conspicuously rare", but the ovates[117], pointed and truncated, of chalcedony and silcrite, which are unrolled, exhibit advanced "wood technique", and are called Acheulian, resemble greatly in form those from Gujarat.

Kenya

A little upwards on the same coast, LEAKEY[118], on behalf of the East African Archaeological Expedition, conducted explorations in the Kenya Colony, principally in the Nakuru, Elementeita and Naivasha Lake Basins and the three rivers Meroroni, Kariandusi, and Gilgil and Malewa, emerging respectively from these lakes. Several seasons' work here in the river gravels and the excavations of caves (Gamble's) and burial sites has resulted in the discovery of cultural phases representing the Early, Middle and Late Palaeolithic, Mesolithic and the Neolithic. As in Europe many of these have been correlated both stratigraphically, palaeontologically and climatologically, besides typologically. The climatic correlation may prove important, as BURKITT has said, for understanding the sequence of cultures and geological changes in South India, and may be even correlated with those sketched out by him and CAMMIADE for South-East India.[119] Whether it will be applicable to Northern Gujarat is doubtful; perhaps it may be applied to Central and Southern Gujarat. For in the Orsang Valley we did notice two distinct layers of gravels, separated by a thin sandy partition.

The Kenya Chellean industry is heavily rolled and not yet well placed in the climatic sequence. The Kenya Acheulean was found *in situ* in the faulted lake deposits belonging to the closing stage of the Kamasian (first pluvial) period. The type station is the Kariandusi River, near Gilgil. The tools, mostly of obsidian, but sometimes of lava such as quartz and trachyte,

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116 *JRAI.*, XLVI (1936), p. 334 and 336.

117 *Ibid.*, Fig. 6, 2; fig. 7, 3; fig. 8, 3; fig. 9, 1.

118 *The Stone Age Cultures of Kenya Colony*, Cambridge, 1931; and the *Stone Age Races of Kenya*, London, 1935.

119 *Antiquity*, 1930, p. 339. The South Indian climate sequence and the East African are as follows:

(a) "Pluvial Period", formation of laterite on the East coast between the Kistna and the Palar.
(b) Long Dry period; deforestation: 1st hand axe culture.
(c) "Pluvial Period", formation of detrital beds: end of 1st culture.
(d) "Dry period", flake Industry, though hand axe survives.
(e) "Humid period", no laterite formation; but formation of alluvium and occurrence of flake industries in them.
(f & g) Decrease in rain fall – denudation – small microlith-like and microlith industries.

The synchronism of climatic sequence and industries in East Africa is as follows:—

1 Long pluvial called Kamasian pluvial.
2 Gradually replaced by very Dry period, which coincided with great earth movements.
3 Second pluvial period, called Gamblian.
4 The close of the Gamblian : intensely dry.
5 First post-pluvial wet phase, called Makalian.
6 Short dry period.
7 Second post-pluvial – wet phase – called Nakuran.

comprise hand axes and rolled and unrolled cleavers. Of these the pointed ovate hand axes, particularly No. 6, pl. vii, recalls a similar hand axe No. 75 from Pedhamli III. The unrolled cleavers, placed in the Acheulean, have not got the U-shape, which is noticed in the rolled Upper Chellean, No. 1, pl. VIII[120]. Whereas these bear a general resemblance to those from Pedhamli I, No. P. 58, the cleavers of the Nanyukin Culture, found along with flat triangular hand axes, ovates, discs, points and scrapers from a site in the forest above Nanyuki to the north of Mount Kenya, have generally U-shaped butt-end, are smaller and trimmed all round. One of these No. 7, pl. XI (fig. 10, 1) bears a close resemblance with the best ones from Gujarat. Unfortunately "there is no direct stratigraphical evidence upon which to decide the exact point in the climatic sequence to which the industry should be assigned." Typologically it is held to be derived in part from the Kenya Acheulean, belonging to sometime during the break between the end of the Kamasian pluvial and the beginning of the Lower Gamblian.[121]

Further work has also been done in other part of East Africa, of which, only a brief summary can be given from LEAKEY.[122]

It appears from the work of WAYLAND and others that the earliest known and the most primitive Stone Age culture in East Africa is the Kafuan. The artefacts of this culture consist usually of a simple pebble form from which one or two flakes have been struck so as to give an irregular cutting edge. Four distinct stages : Earliest, Early, Later and Developed Kafuan are postulated though the first has not as yet been found *in situ*.

Tanganyika

The next cultural stage is called the Pre-Chellean or Oldowan after the type station in the Oldoway Gorge in the Tanganyika Territory. This gorge exposes a series of strata in all 300 feet thick. These strata have provided implements exhibiting the most complete evolutionary sequence of stages of development of the Chelleo-Acheulean hand axe culture starting from the pebble tools. In this evolution there are 5 stages of the Chellean; the hand axe form appears in the third, and is usually biconvex in section in the fifth and the implement almost trimmed around the edge.

The next stratum is marked by the emergence of the Acheulean forms along with the Chellean and also the cleaver. Five further stages of the Acheulean show the predominance of large pointed hand axes in the second, finer and smaller ovates and U-shaped cleavers in the third; of very large exceedingly pointed hand axes, with very thin pointed ends, along with many almond-shaped hand axes and cleavers with a parallelogramic section, but at times square butted; of different types of ovates and almond-shaped hand axes in the fifth. The industry having reached the acme in the fourth and the fifth stages suddenly seems to deteriorate in the sixth though a couple of beautiful cleavers still occur.

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120 In his recent book *Stone Age Africa*, 1936, p. 46 LEAKEY says that the implements that he formerly described as late Chellean were in fact merely unfinished specimens from the factory site 7 the fourth stage of the Acheulean.

121 *Stone Age Cultures of Kenya Colony*, p. 38.

122 *Stone Age Africa*, pp. 39–47.

When detailed literature with drawings and photographs of this complete evolutionary pebble-tool-hand axe culture will be available, it will be worth while comparing the Gujarat palaeolithic culture with it. However, even in the absence of illustrations we are tempted to note the occurrence of beautiful ovate or almond shaped hand axe No. 69, the large, long, thin pointed pear-shaped hand axe No. 226a and the perfect U-shaped cleaver No. 74, all from the silt stratum, i. e. No. III at Pedhamli, with the Acheulean stages three to five of the Oldoway Culture.[123]

Uganda

Material belonging to one or more of the Oldoway Culture has been found in other parts of East Africa. Nearly a complete sequence in Uganda by WAYLAND, Acheulean stage 4 implements at Lewa, north of Mount Kenya, and so far east as Mombasa Island implying that the makers of the hand axe culture had spread right to the sea coast.[124]

O 'BRIEN[125] who followed WAYLAND in Uganda does not agree with the latter's pluvial hypothesis with regard to climatic conditions in East Africa and their correlation with geological and archaeological data. He would rather attribute certain phases to earth movements. This is to be noted for all climatic considerations and correlations when Indian data is studied. Like WAYLAND O 'BRIEN also found a series of stone age cultures, beginning with the Lower Kafuan Pebble culture (found in the Peneplain Boulder-Bed in the Albertine Rift and in the 50ft.± terrace of the Muzizi river above the Rift) and ending with the Wilton-Neolithic. Among these the most important from our point of view are the Middle Acheulean tools found in the Younger Rubble and the Upper Acheulean from the M-Horizon near Nsongezi in the Kagera valley. For we can compare a number of tool types from Gujarat with those of Uganda. Thus a few keeled hand axes from the gravel junction at Pedhamli with similar types from the Younger Rubble[126]; the long cleaver and the almond-shaped hand axes with those of the Early Middle Acheulean from the Phase A gravel[127]; so also the hand axes from the gravel between Nsongezi and Kikogati[128]; the Middle Acheulean biface from the Phase B Rubble[129] and lastly the short stumpy cleavers.[130]

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123 The long, thin pointed hand axe flaked all over, and the cleaver with marginal trimming on the flake side, both from Lewa, North Kenya and illustrated by LEAKEY, *ibid.*, pp. 43, 45 and said to be of Acheulean stage 4, are comparable with the Pedhamli specimens mentioned above.

124 Very little stratigraphical work is done in other parts of Africa. Father TEILHARD'S excavation of a rock shelter at Diri-Daoua in Abyssinia yielded Mousterian implements, while Dr. Erik NILSSON'S work on the Pleistocene Geology of the Rift Valley lakes, the writer has been unable to get, even if it is published. Parts of the Sudan, Nigeria and the Congo are likely to yield rich and important results if explored, as LEAKEY (*Stone Age Africa*, pp. 127-36) has suggested.

125 *Prehistory of the Uganda Protectorate*, Cambridge, 1939.

126 *Ibid.*, pp. 137-39; here Pl. VIII (8), X (13-14) and Pl. XXI (16, 17).

127 *Ibid.*, p. 143, fig. 1; here Pl. VIII (1).

128 *Ibid.*, p. 145; fig. 1; here Pl. X (1, 9).

129 *Ibid.*, pp. 151-153. fig. 1; here Pl. X (14, 15)

130 *Ibid.*, p. 157; here Pl. VII (14).

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O 'BRIEN[125] who followed WAYLAND in Uganda does not agree with the latter's pluvial hypothesis with regard to climatic conditions in East Africa and their correlation with geological and archaeological data. He would rather attribute certain phases to earth movements. This is to be noted for all climatic considerations and correlations when Indian data is studied. Like WAYLAND O 'BRIEN also found a series of stone age cultures, beginning with the Lower Kafuan Pebble culture (found in the Peneplain Boulder-Bed in the Albertine Rift and in the 50ft.± terrace of the Muzizi river above the Rift) and ending with the Wilton-Neolithic. Among these the most important from our point of view are the Middle Acheulean tools found in the Younger Rubble and the Upper Acheulean from the M-Horizon near Nsongezi in the Kagera valley. For we can compare a number of tool types from Gujarat with those of Uganda. Thus a few keeled hand axes from the gravel junction at Pedhamli with similar types from the Younger Rubble[126]; the long cleaver and the almond-shaped hand axes with those of the Early Middle Acheulean from the Phase A gravel[127]; so also the hand axes from the gravel between Nsongezi and Kikogati[128]; the Middle Acheulean biface from the Phase B Rubble[129] and lastly the short stumpy cleavers.[130]

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123 The long, thin pointed hand axe flaked all over, and the cleaver with marginal trimming on the flake side, both from Lewa, North Kenya and illustrated by LEAKEY, *ibid.*, pp. 43, 45 and said to be of Acheulean stage 4, are comparable with the Pedhamli specimens mentioned above.

124 Very little stratigraphical work is done in other parts of Africa. Father TEILHARD'S excavation of a rock shelter at Diri-Daoua in Abyssinia yielded Mousterian implements, while Dr. Erik NILSSON'S work on the Pleistocene Geology of the Rift Valley lakes, the writer has been unable to get, even if it is published. Parts of the Sudan, Nigeria and the Congo are likely to yield rich and important results if explored, as LEAKEY (*Stone Age Africa*, pp. 127-36) has suggested.

125 *Prehistory of the Uganda Protectorate*, Cambridge, 1939.

126 *Ibid.*, pp. 137-39; here Pl. VIII (8), X (13-14) and Pl. XXI (16, 17).

127 *Ibid.*, p. 143, fig. 1; here Pl. VIII (1).

128 *Ibid.*, p. 145; fig. 1; here Pl. X (1, 9).

129 *Ibid.*, pp. 151-153. fig. 1; here Pl. X (14, 15)

130 *Ibid.*, p. 157; here Pl. VII (14).

North Africa

Typological similarity of the South Indian and the Gujarat industries, particularly the cleaver and the long pear-shaped and the ovate hand axes with those from Southern Algeria, North Africa has already been referred to above. Further details can not be had at present because the works mentioned by LEAKEY[131] could not be had.[132] LEAKEY also in his recent book[133] laments the fact that an area which abounds in rich surface material and where the existence of a more archaic type of fauna of the Plio-Pleistocene period has been found, not much exact stratigraphical work is yet attempted. The implements so far found from the gravel deposits from Clairfontaine, in the depression of Lake Karar, the alluvial deposits of Gafsa and the lake basin of Tabelbalat have so far produced hand axes of the later Chellean, and Acheulean types. If "the cleavers found with the developed Acheulean in North Africa are very similar indeed to those from East and South Africa which accompany similarly developed stages of the Acheulean", as LEAKEY observes, the same is true not only of the Sabarmati cleavers but also of the pointed hand axes. We mav compare for instance the late Acheulean hand axe from Sbaïka, Algeria, illustrated by LEAKEY[134], with exactly similar hand axe Nos. 25 and 263 from Ghadhara, and Hadol respectively.

Egypt

SANDFORD and ARKELL's work in the Nile valley has given us a fairly good idea of the palaeolithic periods in Egypt, Sudan and Nubia. In four seasons they surveyed (once SANDFORD alone)[135] the Nile and its terraces from Wadi Halfa to Luxor, and then to Cairo as well as parts of the neighbouring areas of Sudan, the Faiyum (to the south-west of Cairo), and Nubia to the south of Egypt.

Several terraces: 150-foot, 100-foot, 75-foot, 50-foot, 30-foot, 25-foot etc. were observed. The first and the third did not yield any implements, while the oldest terrace from which the palaeolithic implements were extracted was the 100-foot terrace. "It lies 100 feet above the flood plain or (in wadies) above wadi floor, and has now been traced from Wadi Halfa to Cairo. It contains a mixed assemblage of Chellean implements and some which suggest Acheulean affinities. Coarse flakes of Clactonian appearance also occur."[136]

The 50-foot terrace was found to follow the 100 foot terrace, but "meandering on a slightly different plan from Luxor to Asyut, (and) then flowing

131 LEAKEY, *Stone Age Africa*, p. 38.
132 BREUIL, *Cahier's d'Art*, Paris 1931, and VAUFRAY, *Revue de Géographic Physique*, Vol. V, Paris 1932.
133 LEAKEY, *Stone Age Africa*, pp. 99-102.
134 *Ibid.*, p. 103, fig. 14.
135 SANDFORD and ARKELL, "First Report of the Prehistoric Survey Expedition," *Oriental Institute Communication*, No. 3, Chicago, 1928.
Do "Palaeolithic Man and the Nile Faiyum Divide," *Oriental Institute Publication* (*OIP*), X, Chicago.
Do "Palaeolithic Man and the Nile Valley in Nubia and Upper Egypt," *OIP*, XVII, Chicago.
SANDFORD, "Palaeolithic Man and the Nile Valley in Upper and Middle Egypt," *OIP*, XVIII, Chicago, 1934.
136 SANDFORD, *OIP*, XVIII, p. 123.

along the west side of the valley." Its gravels yielded implements which are partly derived from the higher terrace, and which are partly of a well developed Acheulean industry.[137]

Implements from the 30-foot and other terraces lead on through the Mousterian to later palaeolithic and mesolithic industries.

The implement types are thus said to correspond to the Nile terraces: the 100-foot to the Chellean-Acheulean; the 50-foot to the Acheulean; and the 30-foot and younger (or later) terraces to the Mousterian, Sebilian etc. These types are admirably illustrated and so arranged and discussed as to show the evolution from the pre-Chellean forms to the most evolved Acheulean. But in doing so sometimes the evidence for dating the terraces is sought from the tool-forms[138], which leaves us wondering whether we are not going through a circle!! However, the splendid illustrations make the comparative study with the Gujarat palaeolithic industry rather interesting, showing an almost perfect identity in forms, and technique of flaking (as much as can be discerned from illustrations), barring the material. This – unlike the Sabarmati, Orsang, Karjan, quartzite, quartz and trap respectively – was impure flint or chert in Egypt and sandstone and at times ironstone in the Sudan and Nubia.

In this comparison we shall follow the serial order of their publications, as well as the evolutionary series illustrated by them, so that there will be no confusion in citing the references, and it will be possible to know the relative development of the Sabarmati and other Gujarat industries in terms of the Nile palaeolithic industry.

In the first detailed Report which deals with the Nile valley and the Nile-Faium Divide, area to the south-west of Cairo, the series of four river terraces was not traced. The 100-foot terrace is not so far discovered. But the Chellean (waterworn) and Acheulean (fresh) implements were found in an old Nile channel at about 70-85 feet[139]. Line drawings of only two of these are given. Of these the Chellean *Boucher* from Kom Tima[140], west of the present Nile bed in the Faium, resembles very closely a similar hand axe No. 179 from the gravels at Pedhamli, while the Acheulean *Boucher*[141] has a near affinity with such an almost flat, but pointed ovate hand axe, Nos. 25, 139 and 263 from the Sabarmati.

The second Report covers the Nile Valley in Nubia and Upper Egypt, from Semnah or Wadi Halfa in the south to Luxor in the north. In this region artifacts of mixed type, and rolled and unrolled, appear first in the 100-foot terrace. The most primitive type from es-Sibaiyyah, Upper Egypt[142], said to be a

137 *Ibid.*

138 Cf. for instance, "I feel there is sufficient justification, based on the above mentioned implements, to claim an Acheulean age for the completion of the 50-foot terrace." SANDFORD, *IOP*, XVIII, p, 114; and SANDFORD and ARKELL. *OIP*, XVII, p. 76, "On reviewing the whole of the material and evidence within and outside of the district, we do not hesitate to attribute an Acheulean age to the 50-foot terrace."

139 SANDFORD and ARKELL, *OIP*, X, p. 71.

140 *Ibid.*, p. 30, fig. 8.

141 *Ibid.*, fig. 9.

142 SANDFORD and ARKELL, *OIP*, XVII, p. 73, pl. XIII, 1.

coup-de-poing of brown chert of triangular form and zigzag edge is comparable to a similar hand axe No. 139 from the gravel stratum at Pedhamli, as well as Ghadhara No. 18.

No. 2[143] from the same site is supposed to be slightly more refined, though there is a heavy pebble butt. This too has a parallel in No. 66a Pedhamli I. No. 3[144] has a small, broad chisel-shaped edge, though the pebble-cortex remains. Nearly similar features are found in a few forms from the gravel finds at Ghadhara, Pedhamli and Hadol. No. 4[145] has a neater edge, flake scars all over the body, with "the butt intentionally broken." With this may be compared the flaking, edge and form of the front of the lancelot or Micoquian but heavy-butted hand axe No. 181 from Pedhamli I. No. 5[146] is a core, with three-fourths portion marked by clean flake scars and with zigzag edge, has an identical parallel in discoid cores Nos. 60, 210, 170 from Pedhamli I and II, and Hadol. Nos. 7 and 9 are described as "essentially Chellean" coup-de-poings. No. 7 has an awl-like point, but heavy body. This we find in a hand axe No. 50 from Pedhamli III.

With No. 10, a pear-shaped coup-de-poing with a slender elongated point, bold flaking all over the body, trimmed butt, edge less zigzag, found from the surface of 100-foot terrace east of Esua, upper Egypt, has an identical parallel in a hand axe No. 6 from the Karjan Valley.

With Nos. 11, 12, 13[147] begins a series which though Chellean in form shows a marked advance in this that they are nearing ovate or pear-shape, have a symmetrical and smooth outline, and all have their butts flaked except No. 12. All these can be matched with the hand axes Nos. 129, 132, 144 from Pedhamli II.

More highly finished implements, made not only of flint, but in Sudan, of intractable ironstone are met with in the 50 - foot terrace. No. 14, from Ashkit near Wadi Halfa[148], an ovate with an elongated point and boldly flaked over resembles the Karjan specimen No. 6 or the hand axe No. 226a with a thin but rather broad point from Pedhamli III.

The ironstone "disk" No. 16[149] with good outline, biconvex section, and regular outline, though rolled, is similar to the disc Nos. 265 and 6 from Hadol and the Karjan valley respectively.

No. 19[150], a small coup-de-poing of "flint" pebble from the 50-foot terrace at el-Kab, Upper Egypt is called Acheulean because of its "beautiful symmetry, straight edge, and retouched point." All these - the size, form and technique - can be seen in the fine lancelote-shaped and heavy but trimmed-butted hand axe No. 181 from Pedhamli I.

143 *Ibid.*, pl. XIV, 2.
144 *Ibid.*, pl. XV, 3.
145 *Ibid.*, pl. XVI, 5.
146 *Ibid.*, pl. XVI, 5
147 *Ibid.*, p. 74, pls. XXI, XXII, XXIII.
148 *Ibid.*, 75, pl. XXIV, 14.
149 *Ibid.*, pl. XXV.
150 *Ibid.*, pl. XXVII.

Nos. 20, 21 and 23[151], though not found from the 50-foot terrace, but from the 30-foot at Armant, south-west of Thebes and the 10-foot terrace, Thebes, are definitely described as Acheulean, owing to their "outline, precise, bilateral symmetry, and severely straight edge", well regulated retouch of the edge, and "fish scale" flaking all over both the surfaces. The two small hand axes from Pedhamli I Nos. 130 and 230 and III No. 75, and the fine ovate disc or hand axe, No. 69 from Pedhamli III, and the quartz hand axe No. 295 from Bahadarpur exhibit these qualities except perhaps the "fish scale" flaking which owing to the toughness of the material - quartzite and quartz - is not possible, but is nevertheless of the highest craftsmanship visible in the entire Gujarat finds.

The third volume[152] describes the work in the Nile valley in Upper and Middle Egypt from Luxor in the south to Beni Suef in the north. The implements from this portion of the Nile compare well with those of the Sabarmati. Thus the "Primitive Chellean coup-de-poing from the 100-foot gravels near Beni 'Adi,"[153] a sharply heavy-butted triangular implement reminds us of Nos. 133 and 228 from Pedhamli II; No. 3[154], similar but with a sub-triangular, point, from el-Haita, Wadi Kena of No. 200 from Pedhamli II, and the pebble tool No. 8 from Hirpura whereas No. 10[155], the Chelleo-Acheulean coup-de-poing from the gravel in the Abydos bay; No. 11[156], the Acheulean semi-ovate from Bir Arras; the large one, No. 14[157]; the sharp-pointed one, No. 15[158], and the disc No. 16[159] from the 50-foot gravels at Kena, and the small beautiful ovates Nos. 16, 21, 22, 23, remind us respectively of the small hand axes Nos. 230 and 130 from Pedhamli I, No. 75 from Pedhamli III, Nos. 132 and 226 from Pedhamli II, and of the disc No. 6 from the Karjan valley; and of the large, but the perfect, thin, flat and smooth ovate implement No. 69 from Pedhamli III.

No. 24[160], a plano-convex coup-de-poing of Acheulean type from the surface of 300-foot Nile gravel near ez-Zawaidah south of Ballas, has a parallel in form only in No. 51 from Pedhamli III, being decidedly of superior flaking technique to the latter.

Two large, thick, Mousterian flakes,[161] having carefully prepared striking platforms, and rather neatly flaked, from 10 to 15-foot gravels near Nakadah bear a close similarity to flake hand axes Nos. 178, 73 and 180, all from Pedhamli III. Likewise the small blades No. 33, but particularly No. 41 closely resembles Nos. 54 and 123 from Pedhamli III.

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151 *Ibid.*, pls. XXVIII-IX.
152 SANDFORD, *OIP.*, XVIII.
153 *Ibid.*, pl. XV, 1.
154 *Ibid.*, pl. XVII, 3.
155 *Ibid.*, pl. XXI, 10.
156 *Ibid.*, pl. XXII, 11.
157 *Ibid.*, pl. XXIV, 14.
158 *Ibid.*, pl. XXV, 15.
159 *Ibid.*, 16
160 *Ibid.*, pl. XXX, 24.
161 *Ibid.*, pl. XXXIII, 31, 32.

Thus the evolution of the early palaeolithic industry in the Nile Valley, as illustrated by SANDFORD, has been shown by a detailed study to have a more or less parallel evolution in the Sabarmati Valley with this difference that in the Sabarmati the highly evolved Chellean forms (e. g. Nos. 139, 66a and 210) and the Acheulean small ovate (Nos. 230 and others No. 53, 181,) are found in the gravel stratum, the symmetrical, regular-edged, sharp-pointed, spear-head type hand axe No. 226 at the gravel junction, along with cruder forms. And this mixture continues even in the topmost stratum where two hand axes of perfectly ovate, thin and symmetrical form occur along with fine cleavers and two Mousterian type hand axes–on–flake, along with a few other smaller flakes. Slight evolution is thus visible but it does not correspond fully with the three or two strata, namely of gravel, gravel–silt junction and silt, unless it be assumed that the finer–Acheulean–forms belong to the upper stratum and have been redeposited in the gravel. Since the finds were not made in the terraces, as in the Nile, this is most unlikely.

It is imprudent to infer anything more from a close typological similarity between the Nile[162] and the Sabarmati industries. Only further research in and between these widely separated regions might yield some clues.

Middle & Near East

The Middle and the Near East have only in the last decade been systematically explored by prehistorians. GARROD[163] divides them into three zones: (1) The mountain country of the Zagros Arc, (2) The North Arabian Desert and (3) The Coastal region of Syria and Palestine.

From the first zone, the caves of Southern Kurdistan have given remains of 2 periods: one a Levalloise-Mousterian industry; and the second a blade industry of an upper Aurignacian type with shouldered points and numerous notched blades.[164]

Only surface finds have been collected from the North Arabian Desert. Of these, typologically, the oldest is the upper Acheulean, clearly resembling that of Palestine.[165]

Palestine

Miss GARROD's excavation in the great Palestinian Caves has given us a detailed knowledge of the Stone Ages in this region. The earliest, lying at the base, is called Tayacian industry. It consists of small rough flakes. A similar industry was "first identified at La Micoque in Western Europe." "In Palestine, as at La Micoque, it is followed by a late Acheulian, which passes upwards into true Micoquian with its lancelote hand axes." These hand axes[166] found from layer Ec in the Mugharet Et–Tabūn

162 Further westwards in the Kharga Oasis Caton THOMPSON discovered about 500 Acheulian hand axes on the bed-rock beneath spring deposits. WRIGHT, *Tools and the Man*, p. 148–49. When her report is published and made available in this country it would be interesting to compare with this industry.

163 "The Near East as a Gateway of Prehistoric Migration" in *Early Man*, p. 33.

164 *Ibid.*, p. 37.

165 *Ibid* p. 39.

166 *Early Man*, pl. III, opp. page 34; *Antiquity*, 1934, p. 147, pl. IV.

(cave of the Oven), near Atheit, Palestine remind us of a couple of similar hand axes Nos. 181, 179 from Pedhamli I. Another No. 226 from Pedhamli II is Iancelote in form, but has not the slightest trace of a mid-rib. Its two sharp sides gradually become thinner and narrower, and end in an elongated point.

Much new work has been done in European prehistory since BURKITT, MACCURDY, SOLLAS, De MORGAN and others presented the knowledge accumulated up to 1920 in their works.[167] The main general outlines of the development of palaeolithic industries remained practically the same for nearly 12 years.[168] Then in 1932 BREUIL completely revised the accepted chronology by his study of the solifluxion of the Somme river in France.[169]

Europe

This scheme, though primarily applicable to the prehistory of Western France, is now applied to other areas as well granting local variations.[170]

Where do the Sabarmati and the Orsang industries stand in relation to the old and the new European Lower palaeolithic chronology?

The European palaeolithic industries with which the Gujarat ones compare favourably under the old chronology are the lower palaeolithic tools grouped typologically and stratigraphically into the Chellean, the Acheulean and the Micoquian. The hand axe is the predominant tool in all these cultures. But it is seen to develop from its primitive Pre-chellean proto-type, first into a long, sometimes very pointed, at times almond-shaped, with uneven edges, and pebble cortex on the butt-end, into a type where its forms become more oval, edges more even and less serrated, together with a S or twisted variety. Finally it develops in the late Acheulean times into a small oval, almond-shaped form and a new type of industry first found at La Micoque, viz. a small fine triangular hand axe in the shape of a lance point.

Nearly exact parallels of the types mentioned above, and illustrated by BURKITT occur in the three strata at Pedhamli, the ovate type in the gravel stratum at Ghadhara and Hadol and the loose gravel at Bahadarpur on the Orsang. Even the late Micoquian type of hand axe is found as mentioned above, but in the lowest stratum at Pedhamli.

BREUIL divides, according to WRIGHT[171], the Older Palaeolithic industries into flake and biface industries. These in France replace one another mutually several times and end by fusing. His classification is as follows:—

FLAKE INDUSTRIES	BIFACE INDUSTRIES
Ipswichian	Chellean or Abbevillian
Clactonian	Acheulian
Levalloisian	Micoquian
Mousterian.	

167 BURKITT, *Prehistory*, 1925 and *Old Stone Age*, 1933; MACCURDY, *Human Origins*, 1924; SOLLAS, *Ancient Hunters*, 1924; De MORGAN, *Prehistoric Man*, 1924.

168 BURKITT, *Old Stone Age*, 1933.

169 WRIGHT, *Tools and the Man*, 1939 and the works of BREUIL and others mentioned by him.

170 PATERSON, "Geology and Early Man," *Nature*, 1940, pp. 12, 49,51.

171 WRIGHT, the *Tools and the Man*, p. 38.

Of these "the flake tools tend to be associated with cold or glacial climates and the biface industries with warm or Interglacial times."

Though it is said[172] that "the rhythm of alternation may fail north-east or south-west," it has been found possible to recognise in the leading Interglacial deposits of the south-east of England, a scheme of succession of the industries as observed by Breuil in the Mindel-Riss Interglacial of the Somme Valley.[173]

So far very few flakes have been found in the Sabarmati Valley. In these too we note some with typical Clactonian features, in some the Levalloisian, and in some a combination of the both. Most of the hand axes are made from or on pebbles. So we have to deal with more or less a biface core industry. It is not at all possible to compare it stratigraphically with the European biface industry. Some of its main features, however, may be compared with those of the Acheulian, which though subdivided by BREUIL into seven sub-stages, has according to its character three main stages.[174]

In the first or Lower Acheulian (BREUIL's I and II) we have a core and flake industry characterized by large, flat flakes, anvil technique and secondary flaking with bone or wood.

The Middle Acheulian (Breuil's III and IV) shows a great advance in technique. The ovates are thin and regular, often revealing an 'S' curve in the outline of their edges. The core pieces are also very finely worked with delicate elongated points, but have usually a fairly heavy butt.

The Upper Acheulian (Breuil's V and VI) differs little from the Middle Acheulian, being mainly finer and more evolved, and in its elongated forms with straight edges, finely and alternately retouched on opposite faces. This latter technique also characterises Acheulian VII (Micoquian).

When the main features of the Sabarmati are compared with those of the Acheulian detailed above, our impression is once more strengthened that in the Sabarmati valley we have a palaeolithic industry, which shows no definite signs of stratigraphic development, but which on the whole has all the features of the European Acheulian industry; its inferior variety (a) being comparable typologically to the Lower Acheulian; the superior variety (b) with the Middle and the Upper Acheulian.

Character of Gujarat Industry

This however is the difference. In Europe, Palestine, Egypt, Kenya, Uganda, Oldoway, (Tanganyika), Rhodesia, South Africa, Java, the Punjab and South India the typological sequence synchronizes with the stratigraphical, (in Europe with the climatic and palaeontological and-botanical, in Kenya and South India (?) with the climatic), in Gujarat a mixed industry is found in the very lowest stratum. The succeeding stratum does not show any appreciable difference. No doubt the finest forms of hand axes—pear, ovate and oval—and cleavers, together with primitive types of hand axes are seen in the third stratum, viz. fine reddish silt.

172 *Ibid.*, p. 38.
173 *Ibid.*, p. 111.
174 WRIGHT, *op. cit.*, p. 46.

But this development is already anticipated in the gravel stage. We cannot therefore on the available evidence postulate a regular evolution of industry in the Sabarmati Valley.

From the foregoing brief survey we can say however this much that industry (a) called "inferior", characterized by uneven edge, rough irregular flaking, and indefinite patches of cortex represents *typologically* the European Chellean or Abbevillian type; the Madras Boulder conglomerate, Kenya, Uganda and Oldoway upper Chellean and the Egyptian Chellean.

The industry (b), called "superior" which includes small and large ovates, pointed triangular but heavy-butted hand axes, and the cleaver[175], all characterized by symmetrical form, even edges, fine flaking – free as well as "step"-, with or without patch of pebble cortex represents the European Acheulean and Late Acheulean, Madras Attirampakkam Terrace$_2$, the Chauntra of the Punjab, and South African, Rhodesian, Oldoway, Keniya, Uganda and the Egyptian Acheulean.

The fine, almost perfectly smooth, flattish, thin, oval hand axe (or disc?) No. 69 and the two hand axes on flake Nos. 178, 180 from Pedhamli III, a fine small triangular flake, like a point, No. 245 from Warsora, and a pointed ovate hand axe No. 295 and a blade No. 309 with a parallel flake scar from Bahadarpur, if found in Europe, would perhaps be classed as Early Mousterian.

Leaving out of consideration the typological affinity of the Sabarmati Abbevillian and the Acheulean hand axe industries with those of countries outside India, one may ask if such a close affinity with the 2nd phase of the South Indian industry, and the Chauntra [or the 3rd (?)] phase of the Punjab industry is merely fortuitous (due to such as similarity of raw material and wants) or due to the migrations of Early Man ?

Early Man in Gujarat

De TERRA[176] after taking into account the nature of fauna found in the Siwaliks, in the Narbada and the Godavari valleys, in Burma, Java and North China as well as the geologic aspects of South India, the Narbada valley and the Himalayas, the climatic conditions inferred therefrom and correlated with his Ice Age and archaeologic studies, expressed the opinion that Early Man probably came from the tropical belt of South India and went northwards carrying with him his stone industry to the mountain barrier from which the glaciers had retreated. His associate PATERSON has proposed a system of Pleistocene correlation[177], a classification of Lower Palaeolithic Cultures all over the world, and the Development of Pleistocene Man. In this scheme two great families of tools are recognized: the Acheul and the Clacton. The first shows no subdivision, but the latter is divisible into 5 genera, of which the Soan is one.

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175 This even in Europe is regarded the type tool of the Acheulean industry. cf. LEAKEY, *Stone Age Africa*, p. 44 and 182.

176 "Siwaliks and Early Man" in *Early Man*, p. 267 and *Ice Age*, p. 234.

177 *Nature*, 1940, pp. 12, 49, 51.

The Madras industries show a hybrid culture: Middle Soan Acheul and Middle Acheulean Soan and falls within the Middle Pleistocene. The Sabarmati industry with its predominant tool, the hand axe, might be called "Middle Acheulean Soan".[178]

After her study of the Palestinian, African and European, both the Lower and Upper Palaeolithic, industries, Miss GARROD thought that Central Asia and the Far East lay outside the area of the distribution of the hand axe cultures, whose place of origin was generally supposed to be Africa[179], whereas the upper Palaeolithic industry of the Aurignacian type probably originated in Palestine, or even further east. From Palestine and Syria it spread into the Caucasus and skirting the northern shore of the Black Sea entered Europe.[180]

Probable Geological Period

We are not concerned here with the later phase of the Stone Age industries. But the views cited here show that whatever region, South India or Africa or any other is ultimately proved to be the source of the hand axe-cleaver culture, its relation with that of Gujarat will have to be considered. For the present it can be said that two main types-Chellean (or Abbevillian)-Acheulean and Late Acheulean types of Stone Age industries - are represented by the Sabarmati and the Orsang tools. These geologically fall probably[181] into the Middle Pleistocene, since the lowest stratum-the gravel conglomerate-from which they were extracted lies over the laterite in the Sabarmati as it does in the Narbada Valley.

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178 South African prehistorians have thought these propositions "premature" and "over-bold" (*Ibid.*, 1941, p. 47) though PATERSON maintains (*Ibid.*, p. 50) that his "relationships" are profitable though not final.

179 In *Early Man*, p. 35.

180 *Ibid.*, p. 36.

181 Because no fossil fauna has yet been found in the Sabarmati and the Orsang and the laterite beds of the Sabarmati and the Narbada are not yet proved to be contemporaneous.

CHAPTER IV

PART II

MICROLITHIC CULTURE

Distribution of Microlithic Culture in Gujarat

Collection of surface microliths from the sites along the Sabarmati as well as from the loess hillocks in the interior has confirmed the view of FOOTE that this culture had a wide-spread distribution, all over Gujarat and Kāthiāwar. Apart from the question of distribution can we say anything about the culture itself ? Whether it is Neolithic as supposed by FOOTE (because found in association with potsherds), or Mesolithic, or still later of Early historic period by discussing the content of the two small diggings, and comparing it with similar excavations in India and outside.

Character of the culture

The excavation of the three pits at Hirpura, and three pits at Langhnaj yielded besides microliths, potsherds, bone splinters, lumps of yellow-ochre-like clay, small pieces of iron-oxide, a piece of iron slag (from Pit II at Hirpura), chips and small pebbles of quartzite and at times of sandstone, and three kinds of shells.

Nature of Microliths

The microliths include a monotonous series of lunates or crescents, often with battered or worked-back, but at times sharp on both sides, and sometimes sharp only on the arc side, triangles, semi-triangles and trapezes; flat and ridged, long or short blades, roundish, rectangular or square scrapers; tiny disc-like pieces or "core trimmings"; and cores, usually roundish, but at times cylindrical. On the whole the microliths are not fine. There is little or no secondary chipping, except sometimes on lunates and small disc-like pieces. Majority are simply primary flakes.[182] Fine, two-edged, ribbed, long blades are few; so also are points or triangles. Many of the latter could have been used as arrow-heads, but there is no regular specimen either with a concave, hollow back, or a tang. There is no genuine burin either. None of the blades has a real serrated edge; whereas very few end or side-scraper-like pieces are found which have a fine secondarily worked edge. Naturally there are few cores which show parallel flake scars, though there are a few broad, flattish blades which show one or two flake scars on face.

It is not possible to divide such a mixed industry into (i) geometric and (ii) non-geometric microliths, and say that the former might have been a later, and the latter an earlier industry as is done by European prehistorians with regard to the finds from Britain[183], Europe—particularly France, Belgium, and

182 According to CLARK, (*The Mesolithic Age in Britain*, p. XX), a microlith is a flake blunted on one or both edges by steep secondary chipping.

183 CLARK, *Ibid.*

Northern Europe[184]—, Palestine[185], Egypt[186] and Africa[187], especially where no clear regional or stratigraphical demarcation has been observed in Gujarat as in these countries. Probably more exploration will help to settle this point. For the present it can only be said that whereas a general resemblance is evident between Gujarat microliths and microliths from other parts of India[188] and outside, the Gujarat lunate series, perfect segments, segments pointed at one end or both ends, etc. can stand comparison with the best geometric lunate series from elsewhere. And they may consequently be classed as geometric microliths, though not necessarily implying a late industry. Individually the disc-like pieces, which FOOTE called "strike-a-lights" may be "core trimmings," described by CLARK[189]. However the Gujarat disc-like pieces exhibit such fine surface trimming that they might have been put to some such use as suggested by FOOTE. A few scrapers with a hollowed edge at one end have parallels elsewhere.[190]

Potsherds

The next item in our consideration is the potsherds. Unfortunately these are neither numerous, nor in any way distinctive. However their detailed discussion may be useful for dating the culture. Hence first a fairly detailed description and classification is given of potsherds from the pits at each site. This is followed by a comparison between the nature of pottery from the pits at a particular site. Then comes comparison between the pottery from two sites and conclusion.

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184 CLARK, *The Mesolithic Settlement of Northern Europe*, pp. 208–210 and 216.

185 GARROD, "A New Mesolithic Industry: The Natufian of Palestine", *JRAI*, LXII (1932), p. 258. Lunates and triangles seem to be included in geometric forms, others–non-descript forms–into non-geometric, though they are not actually called so.

186 For instance the upper Sebilian from Egypt which as SANDFORD (*OIP., XVII*, p. 79) says, "is an industry of little but microliths". Many of its cores and blades are comparable to those of Gujarat; particularly Nos. 79 and 80 which having "the retouch which is almost unparalleled in its minute size and remarkable accuracy" remind us of the minute "core trimmings" or "discs" of Gujarat.

187 Cf. for the instance the Capsian of French North Africa LEAKEY, *Stone Age Africa*, p. 106 ff.

188 From his study of FOOTE'S microlithic collection from different parts of India and Ceylon in the Madras Museum, as well as of other collections from Java and Ceylon in the same Museum, the writer is of the opinion that Gujarat microliths on the whole appear to be inferior to those from other parts of India, Ceylon and Java, particularly in certain types. The Maski, Kallūr and other Hyderabad (*AR. AD. ND.*, 1939, pl. XI; 1942, pl. X) specimens as a rule are longer than those of Gujarat. Those of Sukkar and Rohri are much longer and better, predominating in fluted cores and fine, thin, long blades. These also are, presumably, the latest in the series continuing as they do in the Indus culture. Perhaps the material, flint, is responsible for such beautiful artifacts. Slightly smaller than those of Sind, but larger than Gujarat finds are from Bābāpur in Kathiawar. All are of snuff-coloured chert. Among them is a biserrated blade No. 3568, a chisel No. 3533 and a genuine arrow-head No. 3570; another is from Umria-Dhari No. 3892. Of course FOOTE also got a fine serrated blade No. 2919 from Bahadarpur. A real burin he got from Jabalpur (No. 4055). Among his South Indian collections, the Bellary group is good. It has a most beautiful serrated blade of chert. The Ceylon specimens are mostly of limpid quartz and in this respect are comparable to those from Hadol area. Among these there is a fine arrow-head (C. M.). But perhaps none is comparable to a concave-backed arrow-head of chert from Java (Koenigswald).

189 *The Mesolithic Age in Britain*, p. xix.

190 *Ibid.*, (From Constantine Bay, Cornwall), Fig. 23, 18; Fig. 25, 11, Fig. 59, 50.

Potsherds from Pit I,
Hirpura

A general classification of the potsherds from D1 and D2 (the two uppermost strata) shows that the sherds are divisible into two main varieties – red and black. But after a minute classification of each variety according to colour and thickness, there are 9 sub-varieties of red ware.

These are :—

Red ware

(a) Smooth with red surface owing to red slip, and coarse brown underside. Nos. 9 and 109.
(b) Smooth bright red surface owing to red slip and coarse brown underside. Nos. 10–14 and 106.
(c) Thick coarse dusty brown on both sides. No. 19.
(d) Medium to thick coarse brown on both sides. Nos. 20–22, 107 and 111.
(e) Medium to thick, originally bright red on both sides but now dusty - found in D 2 only. No. 110.
(f) Similar to (c) in colour but thinner. No. 118.
(g) Thick, smooth chocolate brown - originally perhaps on both sides–but now on one side only. No. 119.
(h) Medium, smooth bright red on one side, and smooth black - now dirty - on the other. No. 113.
(i) Similar to (h) but thicker and coarser. No. 108.

The clay in all the types is well-levigated, though imperfectly burnt, as shown clearly by some pieces, whereas Nos. 9 and 10 seem to be definitely pieces of wheel-made pottery.

Only three, in fact two pieces were found from D3. Of these one is very tiny, other pale, dusty brown, thin and soft. If a potsherd, it must be hand-made.

Black ware

The black ware is divisible into three sub-types:—

(a) Thick, black on both sides.
D 1. Nos. 15, 18, 27; D 2. 83, 90, 114–118.
(b) Medium, black on both sides.
D 1. Nos. 23–26; D 2. 83–84, 87, 89, 92–96.
(c) Medium, coarse black on one side; dusty brown on the other. Nos. 16–17, 86, 112.

All seem to be well burnt, and (a) definitely wheel-made.

Potsherds from Pit O,
Hirpura

There are interesting specimens in this lot, specially Nos. 497a – d (ii)[191], and 490–92 (ii). Both are fragments of thick plates or dishes which were

191 See Pl. XVIII (b), top left.

black and red respectively. Both were definitely wheel-made, whereas the black has smooth surface, the red comparatively coarser. No. 490 shows also a part of the raised impression which perhaps formed a circular decoration in the plate.

Other pieces Nos. 493, 495–97 are fragments of thin black pottery; which was smooth on one face and coarse on the other. It is similar to No. 23–26 from Pit I, D 1. A fourth class of pottery is represented by No. 494, a fragment of a coarse dusty brown pottery.

Types (i) and (ii) are totally different from slightly similar wares from Pit I, D 1 and D 2. These are not only wheel-made, and thicker, but appear still of a better make. Type (iii), a solitary piece is not represented in Pit I. Type (iv) black ware, seems to be identical with similar patterns from Pit I, D 1 and D 2.

From the second stratum D 2, come 5 types of pottery, almost all dissimilar from that of stratum I, and also from that of Pit I. All are however wheel-made, the finest being type (v), represented by No. 505.

Potsherds from Mound I, Langhnaj

D 1. No. 39.	(i)	A buff coloured piece – now lost ?
D 2. No. 78.		(a) Thin, smooth red outside, coarse brown inside, wheel-made, well-baked.
79, 80, 82, 83.		(b) Medium, coarse brown pieces, sun-baked (?)
No. 81.	(ii)	Thick, black, smooth on both sides, part of rim.
D 3. No. 93		Thick, smooth red, dust-crusted, outside, coarse black inside, blackish core, hand–made, imperfectly fired.
D 5. No. 100		Thick dusty, coarse, hand-made, sun-baked.
D 6. No. 114		(a) Similar to D 4.
No. 115		(b) Thick, coarse brown, part of rim, hand-made.

Potsherds, Mound II, Pit I

D. 1. Nos. 249–256	(i)	*Red ware*
		(a) Medium, coarse, dull chocolate, hand-made ? No. 249.
		(b) Medium, coarse brown, dusty on one side, hand-made. Nos. 250, 255.
		(c) Similar to (b) but a little thinner. No. 254.
	(ii)	*Black ware*
		(a) Thick, black, smooth on one side, coarse on the other, part of rim, wheel-made ? No. **252**. Thick, black No. 253.
		(b) Medium, coarse blackish, but core dusty brown, hand-made.

D 2. Nos. 313–323

(i) *Red ware*

(a) Thick to medium, coarse dull brown on both sides, blackish core, [almost similar to (b) of D 1], hand-made. Nos. 313–315, 319.
(b) Medium, smooth on one face, yellowish silty core, hand-made, No. 321, also No. 316.
(c) Thick to medium, coarse brown dusty core, hand-made (?) No. 322.
(d) Thin, smooth, brown on one face, coarse blackish interior, wheel-made. No. 320.
(e) Medium, white crust on thick red wash on both sides, blackish core, hand-made (?) No. 323.
(f) Medium, creamy, smooth coarse white inside; well-levigated clay.

(ii) *Black ware*

(a) Thick, black. No. 317 [Similar to (a) of ii D 1].

D. 3. Nos. 402–403

(a) Medium, dull brown and smooth on face, blackish core and underside, hand-made (?). Nos. 402, 404. No. 403 sandstone.

D 4. Nos. 521–522

Both pieces similar to (a) of D 3.

Potsherds, Mound II
Pit II

D 1

(i) *Red ware*

(a) Nos. 761–63 — Thick, bright red, now dusty owing to a film of silt on both sides, not very coarse. No. 761 part of a rim.
(b) Nos. 765, 767 — Thin, smooth brown on face, smoky core, coarse underside.
(c) Nos. 766, 769, 770, 773. — Thick, coarse, bright red on face, dull brown underside, blackish imperfectly fired core.
(d) Nos. 768, 775. — Medium, bright red on face, very coarse light brown underside, well baked.

(ii) *Black Ware*

(a) Nos. 760, 771, 772, 774, 776 — Thick to medium, smooth black on both sides. No. 760, part of a rim, wheel-made.
(b) No. 764 — Thick, very coarse, black on both sides; hand-made.

Brick pieces

Nos. 777, — A large piece, bright red, heavy.
778–80 — A small piece, very soft like ochre.

35

D 2 (i) *No red ware.*

(ii) *Black Ware*

No. 817 A small piece of medium, black pottery; remains of two parallel incised lines on one face.

No. 818 A tiny piece.

D 3 (i) *Red Ware*

No. 884 Thin, smooth, bright red on face; dull brown inside, almost similar to No. 768 of D 1.

No. 885 Thinner, but otherwise similar to No. 766 of D 1.

No. 888 Similar to No. 766 of D 1.

(ii) *Black Ware*

No. 883 Medium to coarse, blackish, part of a rim.

Nos. 887–88 Tiny, thin, coarse, black pieces.

Nos. 889–91 Pieces of yellow ochre.

Comparison between the Pottery from Pit I & II, Mound II

In red ware, there are no exact parallel pieces from Pit II to correspond with those from Pit I. Perhaps the black ware pieces from both the pits are similar, though there are only two pieces from Pit I to compare with the potsherds from Pit II.

Majority of the red ware pottery from Pit I seems to be hand-made.

The black pottery from both the pits is definitely wheel-made, except a piece No. 764 from Pit II, D 1, which is of hand-made pottery.

Comparison between the Pottery of Mound I & II at Langhnaj

There is not much to compare between the pottery from the two mounds at Langhnaj.

Only one piece No. 87 from mound I, seems to be similar to the black ware No. 317 of mound II, Pit I. Both the sites have produced a number of pieces of hand-made and sun-baked pottery, but there the comparison stops. In nature and colour they are different; that of mound I is coarse and rougher, that from mound II, Pit I seems to be made out of the alluvial silt.

Comparison between Hirpura and Langhnaj Pottery

One kind of black pottery represented by No. 15 etc. from D 1 and No. 83 from D 2, and No. 497–a (D 1, Pit 0) and No. 502 (D 2, Pit 0) resembles similar black ware, No. 81 (D 2, Mound I, Langhnaj) No. 252 (D 1, Pit I, Mound II) and No. 760 etc. (D 1, Pit II, Mound II). All these are fairly thick pieces of black ware with well-levigated clay, wheel-made and well burnt. Of course the finest is No. 497–a (from Hirpura, D 1, Pit 0).[192]

192 See Plate XVIII (b).

Since this pottery is not found below 1 foot it may be regarded as later.

In red ware too no exact similarity is visible. But in fineness of texture and making we may compare No. 9 (D 1), No. 109 (D 2), Nos. 10-14 (D 1), No. 206 (D 2) of Pit I, Hirpura with No. 78 (D 2, Pit I, Mound I) and No. 768 (D 1, Pit II, Mound II, Langhnaj). In clay etc. it is similar to the black ware described above.

There is also another type, smooth, dull-brown on face, coarse inside, and having an ill-burnt core. A few pieces of this are found in Pit I at Hirpura, but more and of a larger variety are found on Mound II at Langhnaj. Whereas the first type is definitely wheel-made, this second type is very probably hand-made. As this and a still inferior type of pottery is found up to 3 feet at Hirpura (Nos. 272-73, D 3, Pit I), and more at Langhnaj, No. 100 (D 5), No. 114 (D. 6 ?), No. 402 (D 3), Nos. 521-22 (D 4) Pit I, Mound II and Nos. 885, 888 (D 3), Pit II, Mound II, it may be regarded older than the finer black and red ware found in the earlier levels and to be coeval at least with the later phase of the microlithic culture in this part of Gujarat. The same may be said of the very coarse, hand-made, and blackish ware from D 1, Pit II, Mound II at Langhnaj.

It must be evident from above that for the purposes of dating potsherds are not so useful. There is nothing distinctive about them. This much, however, appears certain that potsherds are either later and subsequent to microliths, or that they belong to a later period (?) of microliths.

Brhmagiri Microlithic site

Not much help in this connection can be had from other parts of India, for only a few such sites are excavated, and the resultant evidence is rather confusing. At Roppa[193], a site near Brhmagiri in the Mysore State, microliths began to be found at a depth of 5 feet along with neoliths and painted and grey unpolished pottery and continued to appear till a depth of $8\frac{3}{4}$ feet, but the pottery became coarser. From this evidence it is thought to be a late microlithic or an "early neolithic-microlithic culture, parallel to the Campignian of France," when pottery had come in use.

Maski

The main site at Maski in the Hyderabad State, as reported, gave a very bewildering sort of evidence from which no idea of sequence could be had. Microliths and pottery were found at various levels[194]; the latter "at site D up to a depth of 8 feet and at E 5 feet", the former in large quantities up to 5 feet. GORDONS re-examined the area[195], and found pottery in one section down to 11 feet. Even this – coarse brown surfaced pottery with black inside found at 10 and 11 feet below surface – they consider wheel-made and not earlier than the 5th century B. C. The only hand-made pottery is the primitive blotchy pale brown pottery found in caves at Maski.[196]

193 M. H. KRISHNA, "Presidential Address", *Section of Anthropology, 29th Science Congress*, Baroda, 1942, pp. 23-26.
194 *Annual Report, Archaeological Department, Nizam's Dominions*, 1939, p. 116.
195 "The Cultures of Maski and Madhavapur" *JRAS. Bengal*, Letters, IX, 1943, p. 87.
196 In a letter to the writer dated 14-7-43.

Re-examination of the Madhavapur site in the Belgaum District, which "was reputed to be replete" with painted pottery, yielded not more than 2 painted potsherds, and a large amount of other pottery. Of this, that found in the ash deposit at 8 feet 9 inches, a potsherd with a highly polished black slip, is held to be a little later than that at Maski, whereas the thin sectioned, slightly polished pottery found at 9 feet B. S. to be of early 3rd century B. C.[197]

Mahadeo Hill, C. P.

Excavating a rock shelter in the Mahadeo Hill, Pachmarhi, Central Provinces, HUNTER[198] found that the surface down to 6 inches was strewn with pottery, whereas below it, a foot deeper, there was a skeleton and typical Tardenoisian (microlithic) flakes and implements, but no pottery at all. He therefore concluded that in Pachmarhi, as in Europe, these people lived before the Metal and even the Neolithic Age.

GORDON, from his study of the paintings on this rock shelter, said that they range from the 2nd–3rd century B. C. to the 10th century A. D.[199] So it is concluded by him and others (BURKITT, for instance) that the microliths at this site and elsewhere in India are also of this period and not older.

Uchali, Panjab

De TERRA[200] also found in a small excavation in the upper loessic deposits at Uchali, west of Naushahra in the Panjab microliths of brown jasper or flint along with hand-made pottery and skeletal remains of *Homo Sapiens* of dolicocephalic type. The human remains are greatly bleached and very brittle. No definite view is expressed on the age of the culture, but the pottery is believed to be of neolithic type. It is further suggested that the loessic deposits may yield *links between the palaeolithic and neolithic cultures.*

The conditions at both Hirpura and Langhnaj seem to correspond with those in the Mahadeo Hills, with this difference that potsherds in the former, though in a very small quantity are found in all pits up to 3 feet, and in Pit 1, Mound I at Langhnaj even up to 5 feet.

Bone splinters

Another important item, after microliths and potsherds is bone splinters. A few of this were found at Hirpura, many more in Pit I, Mound I at Langhnaj but a large quantity from Pits I and II on Mound II. Almost all of these are in varying degrees of fossilization.

These numerous splinters, some of which are "charred"[201], and a few carbonized, show that men who lived on the mounds were probably hunters, and further that they not only used the flesh of the animals and birds they killed, and intentionally broke the bones for the marrow but prepared small microlith-like implements from the bone splinters, generally tubular bones – and used fire (?) The last two facts now seem most probable. For otherwise there is no way to account for the existence of so many "charred" bones, minute splinters, amongst which are some definitely shaped by an oblique or vertical cut at one

197 GORDON, *op. cit.*, p. 95.
198 *Nagpur University Journal*, No. 1, 1935, p. 31; No. 2, 1936, p. 127.
199 GORDON, *Arts and Letters*, 1936, pp. 35–41.
200 *Ice Age*, p. 277–78.
201 The writer has been unable to ascertain whether the charred, blackish appearance is due to fire or to the deterioration brought about by long submergence in sandy, loamy soil.

end of the splinter. How the writer arrived at the conclusion that some of these splinters are bone tools, and the chief types of tools are given below in detail, since previously a mere reference was made while enumerating the contents from each pit.

Bone Tools

During the excavation of microlithic sites at Hirpura and Langhnaj a large number of bone splinters, almost all fossilized, some partly, some fully, and some also "charred," were noticed usually between 2 feet to 6 feet. At Hirpura the splinters were not in a large quantity, and were found only in Pit I. All these, however, were collected and carefully packed for future study. But at Langhnaj a much larger number of splinters began to come out, particularly from Pit I and II, Mound II. The writer examined each lot as it emerged, and found that some of these splinters showed clean pointed facets, while a few others had a nib-like point and body. He consequently thought that these pieces were probably small bone tools, prepared in imitation of microliths, in whose association they were found. His view was however not supported by his field-colleagues, Dr. B. K. CHATTERJI and Mr. V. D. KRISHNASWAMI whom he consulted when they rejoined him after their work at Delhi, though both of them agreed that the large mass of splinters showed that bones were for some purpose fractured by human agency.

The problem again cropped up when the finds were being systematically examined while preparing the report of the Expedition's work. After sorting out all the tool-like pieces, the writer invited Dr. G. M. KURULKAR, Professor of Anatomy and a keen student of physical anthropology to examine these pieces as well as the entire bone collection. He very kindly acceded to the writer's request. In his opinion the collection was in varied stages of fossilization, whereas the tool-like pieces were intentionally chipped and were definitely tools. He was again consulted after 6 months. This time he went through the entire collection with the writer's colleague Dr. Mrs. KARVE, Reader in Sociology and Anthropology. Both of them agreed with the writer's view that these pieces were definitely tools, since they showed not only intentional chipping, but always at a certain point in a definite manner. In some cases of small tubular bones, the point is made by an oblique cut, on the inner side, concave by removal of the marrow, just as we make a reed pen.

These bone objects vary in length from ¼ inch to 1 inch, in breadth and thickness from ¼ inch to ½ inch. Some of the larger rectangular ones may well be compared with match-sticks, while the smaller ones with a long point and a broad body slightly convex on one side and concave on the inner side with "Relief" or similar kind of nibs. Some pieces are "charred," though all are partially fossilized.

From the manner of cutting, the tools may be divided into the following 9 types.[202]

1 Rectangular pieces, cut obliquely at one end.
2 Rectangular pieces, cut obliquely at both ends.
3 Rectangular pieces with spatulate end.

202 See Pls. XIX and XXIX (b).

4 Pieces triangular in section with obtusely cut point.
5 Nib-like pieces with sharp long point and broad body, slightly convex on one face and concave on the other (inner) side.
6 Crescentic pieces with blunted arc and smooth chord and sides.
Thick crescentic pieces smooth all over, as if by rubbing, but showing original facets. (There are three such objects No. 225 K, No. 26 from Langhnaj, Pit I, mound I in microlith collection all having a polished surface noticed in neoliths.)
8 Burin-like objects, with their points cut obliquely as well as in a reverse fashion.
9 Rectangular pieces.

Probably these are the first bone finds of microlithic type in India, which are definitely recognized as tools. Till now bone tools of the later Palaeolithic, particularly the Magdelenian and of the Mesolithic period, from a number of sites in Northern Europe[203], Britain[204], Palestine[205], Africa (the Wilton of Kenya[206] and Rhodesia[207]), Ceylon[208] and India[209] are known. But all these are much larger in size and cannot be compared with Gujarat finds. In one thing, however, the latter may be compared with Magdalenian[210] and Magalmose[211] bone tools. This is in the technique. The points of axes, adzes etc. were prepared by cutting one side obliquely; sometime by cutting at right-angles to the surface, whereas the teeth of a beaver were split length-wise and had bevelled edges. All these three methods can be noticed in tools from Gujarat, which may be called "Micro-bone Tools."

203 CLARK, *The Mesolithic Settlement of Northern Europe.*
204 CLARK, *The Mesolithic Age in Britain*, p. 15. Numerous "chisel shaped" tools in bone, besides harpoons from MacArthur Cave, Scotland, have not been illustrated.
205 GARROD, *JRAI*, LXII (1932), p. 258, 261, pl. xxii, Fig. 1; and TURVILLE-PETRE, *Ibid.*, p. 272, pl. xxvi.
206 LEAKEY, *The Stone Age Cultures of Kenya Colony*, p. 101, pl. xiv and p. 175. These – a few awls – are of the Kenya Aurignacian and the Kenya Mesolithic periods respectively. But the awls of the former though described as "delicate" are 3 to 6 inches in length and hence not "micro-bones."
207 ARMSTRONG, *op. cit.*, *JRAI.*, LXI (1931), p. 264, Fig. 8, GARDNER, *Ibid.*, LVIII (1928), p. 498, fig. 10, BURKITT, *South Africa's Past in Stone and Paint* p. 92. Chiefly awls, according to BURKITT, whose material was still fresh and not fossilised.
208 From the 'Udupiyan Galge, and Batadomba lena caves in Ceylon DERANIYAGALA recovered in association with microliths bone artifacts and large pebble tools. Some of these bone tools are small but perhaps not so small as Gujarat micro-bones. *Nature*, April 1942, pp. 384–85.
209 After NEWBOLD, FOOTE found from the Billa Surgam Caves, Kurnool District, S. India "bones of extinct and existing animals and a number of prehistoric objects of Magdalenian type." "These included *inter alia* specimens of pendants made of teeth, and other artifacts made of bone." (*Indian Prehistoric* and *Proto-historic Antiquities*, 1916, p. 191). No further details of these bone objects are given. But even if tools, they seem to be larger and not small like microliths. Dr. HUNTER while excavating the rock shelter in Mahadeo Hills, Central Provinces got with typical Tardenoisian microliths a skeleton, but he does not mention bone tools. (*Nagpur University Journal* I (1935), p. 31; II (1936), p. 127.
210 BURKITT, *Prehistory*, p. 344, pl. VI.
211 CLARK, *The Mesolithic Settlement of Northern Europe*, p. 110–12, Fig. 40.

Some of these micro–bone tools appear to be brittle now, but when freshly made, these as well as others must be fairly strong to be used as piercing tools, such as awls, drills, and the finer ones, the nib–like pieces, for painting or tatooing the body (?).

List of Bone Tools from Hirpura and Langhnaj

Site	Pit	Level	No.	General Nature
Hirpura (EH)	I	28″	210	A small piece, over ½ inch in length, rectangular, but bevelled at one end to form a point; marks of cutting are on the face; the other side is also pointed, but perhaps naturally. The tool is now smooth, and partly fossilized.
"	"	41″	336	A tiny piece, less than ½ inch, trepezoid in shape. Looks like an implement because of its faceted sides.
Langhnaj Mound I (EL. I)	I	D 1	51	A small piece, over ½ inch in length, rectangular, but thick and "charred" at one end, narrower at the other.
			52	A small semi-circular piece; has thick battered sides around, and smooth upper and under sides.
			53	A tiny crescent-like piece, has a bevelled point; the cut is from above on the face.
		D 2–3	85	A small crescent–like piece, smooth face and underside, battered back. Tiny smoothing tool (?)
			90	A small rather thick rectangular piece, smooth on face and underside; battered sides, perhaps broken at the back, and bevelled on one end.
Mound II (EL. II)	I	D 1–2	348	A small rectangular piece, broken at one end, but the other end is bevelled into a blunt point; the cut is on the upper side as in EH. 210, or EL. I. 53.
			349	Similar to No. 348, but the point is sharper, and the chipping is on all the four sides.

Site	Pit	Level	No.	General Nature
Mound II (EL. II)	I	D 2	350	A tiny piece, rectangular, has a steeply sloping side ending into a point; the upper side is cut to form the point.
			413	A small rectangular piece, has a bevelled point, made by a cut on the upper surface.
			414	A small piece, ½ inch in length, like a nib, broad plano-convex at one end, and pointed at the other. The point is elongated, and has a bevelled edge. This point may have been achieved as in a real burin, only the sides are slightly concave and not straight.
			415	A small piece, exactly an inch in length. It has a long twisted underside, and ridged face, which ends in a nib-like point.
			406	A small cylindrical piece, now broken at both ends; one side is smooth, while four long facets are seen on the other. Intentionally chipped, though there is no point.
			407	A tiny rectangular piece, bevelled at one end.
			408	A tiny lozenge-shaped piece, faceted at both ends, has a sharp point at one end.
			409	A tiny piece, with an obliquely cut side and point.
		D 4	622	A small piece, with a long obliquely cut side ending in a point. (Cf. such "Points" in microliths, CLARK, *Mesolithic Age in Britain*, XX.)
			623	A flat sub-triangular piece, with obliquely cut sides ending in a point.
			624	A lozenge-shaped tiny piece, with a sharp small oblique cut ending in a point.
			625	A piece similar to No. 624, but has obliquely cut sides at both ends.

Site	Pit	Level	No.	General Nature
Mound II (EL. II)	I	D 4	626	A small rectangular piece, with a spatula-like pointed end, achieved by obliquely cut sides.
			627	A small piece, with obliquely cut points at either end; but at one end the point is sharper.
		D 5	667 A	A thick semi-circular piece, with hollowed, or concave inner side, smooth all over.
			667 A_1	A flat, perfectly semi-circular piece. If not a tool, definitely made into this shape by human agency.
			669 A	A small thin piece, with a twisted body, sharp point obtained by obliquely cut side; a small cut over the face.
		D 6	695	A nib-like piece, similar to No. 414.
			695	(1) A thick crescentic piece, "charred" and semi-fossilized, has a blunted arch, and smooth cord and sides.
			695	(2) A rectangular piece, with an obliquely cut point.
			695	(3) A tiny three sided piece with an obliquely cut point.
			695	(4) A rectangular piece, now " rolled " and hence rounded, has obliquely cut point.
			695	(5) A plano-convex piece, has a small point by oblique cuts on two sides on face.
			695	(6) A piece similar to 695 (1).
			695	(7) A small rectangular piece, with obliquely sides ending in a point.
Mound II (EL. II)	II	D 1	784 A	A crescentic piece, one end obliquely cut, the other gently slopes, but does not show definite signs of flaking.
			784 A_1	A triangular piece, with a sharp projecting point.

Site	Pit	Level	No.	General Nature
Mound II (EL. II)	II	D 1	784 A_2	Similar to 784_1, but the point does not project so much, and the sides have sharp oblique cuts just at the point. The butt-end or back is also cut at right angles, giving a smooth facet.
			784 A_3	A tiny rectangular piece, with an obliquely cut side; the butt-end is also similarly cut.
			785	A rectangular piece, about one inch in length, slightly " charred " and fossilized; has a obliquely cut point.
			785_1	Similar but smaller than 785 and not "charred".
			785_2	Very tiny, triangular; obliquely cut point.
			785_3	A rectangular piece, slightly "charred" and fossilized; the face has obliquely cut point, whereas the rest gently slopes towards the other end.
			785_4	A tiny rectangular piece, obliquely cut at both ends.
			785_5	A thick semi-circular piece, smooth all over with a ridge-like facet on one side.
			785_6	A tiny crescent, with a blunted arc and flat chord and sides.
			785_7	A pointed ovate piece, has a rough, coarse surface, except near the point on one side, and a sloping butt-end.
		D 3	871	A triangular buff coloured piece, smooth flat on one side; slightly concave on the other; has a slightly obliquely cut and bevelled point.
		D 2	820_a	A sub-triangular, "charred" piece; has a obliquely cut point, and a bevelled butt-end.
			820_{a1}	An irregular rectangular piece, with an obliquely cut sharp point.
			820_{a2}	A much faceted piece, with a curved end.

Site	Pit	Level	No.	General Nature
Mound II (EL. II)	II	D 2	820_{a3}	A rectangular piece, with an obliquely cut point, the upper surface is slightly cut at the point, as in a burin.
			820_{a4}	An irregular piece, with an oblique cut on face at one end.
			820_{c}	A tiny piece, with an obliquely cut point. (The point was sharp, but its tip was broken while examining it.)
			820_{c1}	A trapezoid thick piece, has obliquely cut ends. Due to weathering and encrustation of carbonate of lime, the facets are now rough and uneven.
			820_{c2}	Similar to 820_{c1}, but the face is more angular. Similarly encrustated.
			820_{c3}	Piece of a tubular bone; inner side slightly concave; outer side smooth and flat; one end cut obliquely to form a sharp point.
		D 3	895, 895_1	Rectangular pieces, cut from a small tubular bone.
			895_2	A rectangular piece, about an inch in length, cut off obliquely at one end.
			895_3	Similar to 895_2, but smaller and slightly rolled.
			895_4	A flat rectangular piece with a spatulate end.
			895_5	A rectangular piece, with obtusely cut point.
			895_6	A rectangular piece with an obliquely cut point.
			895_7	A triangular point, one side is smooth and flat, the other is uneven.
		D 4	917A	A rectangular piece, about an inch long, with an obliquely cut point.
			$917A_1$	Similar to 917 A.
			$917A_2$	Similar to 917 A_1 but the piece is "charred", and seems to be part of a tubular bone.
			$917A_3$	Similar to 917 A but has a sloping end.
			$917A_4$	Tiny " charred " piece, with an obliquely cut point.
			$917A_5$	Similar but the point is of an arrow-head shape.

Large bone fragments

Besides minute splinters, there are a few long bone pieces, and bones of extremities and human and animal teeth. Some of these are identified.[212] The identification shows that the people who lived on these sites, probably killed the buffalo, the ox, the calf, and the goat and used their flesh as well as the marrow for food.[213] The existence in this vast heap of bone splinters and fragments of human teeth, parts of the skull etc. cannot be explained at present.

Shells

There are three types of shells. The so-called "conical" is a fresh water gastropod shell. The second "spiral" type is a terrestrial type or Helix. The third shining variety is a fresh water lamellibranch Unio. In some cases the pearly layer is well preserved. The fragments however do not include hinge-parts; hence a more accurate description is not possible.[214]

Yellow ochre

The occurrence of a few yellow ochre-like lumps, if these are not natural formations in the loess, can be explained on some such ground, as painting the body. If found in a cave with paintings, as the Bambuta Cave they could have been supposed to be used for wall-paintings.

Quartzite and Sandstone

Mere occurrence of a few chips and pebbles of quartzite and sandstone nodules is disappointing. Whereas these merely show that people here used these stones, probably as hammers, and sometimes even prepared microliths out of these chips, the non-occurrence of regular hammers, and still more of hand axes and other heavier tools of palaeolithic nature gives us no clue as to the connection of this culture with the palaeolithic culture of Middle Pleistocene times. Nor is there any clue for its connection with the metal age cultures of proto-historic and historic times. Only one large lump of iron slag was found almost on the surface in Pit II at Hirpura. This does not prove much, and the microlithic content of this Pit is so poor that this end of the mound does not seem to have been much inhabited.

Character of the Gujarat Microlithic Culture

Taking into account the general nature of the sites, the content of the excavations, and the similarity or affinity of the two former with similar conditions elsewhere in India and outside, it may be said that the culture was similar as far as the semi-arid, loessic nature of the site, as well as the microlithic nature of the tools is concerned to those found on isolated sandy

212 See Appendix IV.

213 These elements of the material culture of Langhnaj remind us of a similar culture excavated from the Ensdorf cave, Bavaria, (CLARK, *Mesolithic Settlement of Northern Europe*, p. 200). Besides microliths, it includes much evidence of bone work; tips of two pointed objects, and a fragment with signs of sawing; three bow-shaped pins of fine ribbones; a fragment with incised lines and numerous fragments of bird bones. None of the bone tools are however microlithic in character.

214 The writer owes the identification of these shells to Prof. K. V. KELKAR.

areas in Europe[215]; in Britain in sand dunes or on sandy wastes[216] and those found in South Africa, Palestine, Ceylon and different parts of India. But in our present knowledge it cannot be called a Mesolithic culture, for no stratigraphic evidence is available to connect it with the preceding palaeolithic culture, the immediately preceding upper Palaeolithic culture itself being either absent or hitherto undiscovered in India. For the same reason it cannot be definitely called a Neolithic Culture. The existence of potsherds, a few remains of the domesticated animals like the goat, the ox and the buffalo, and also that of three neolithic-like polished "ruddles" (?) may be cited as evidence for holding such a view, as has been done by Dr. KRISHNA, and the culture described as Microlithic-Neolithic.[217] But it means little unless we are able to date the earlier and later phase of this culture. Nothing positive can be said about its Neolithic phase, represented by a terracotta figurine, a few potsherds, the three polished haematite pieces and the few identified remains of domesticated (?) animals. The potsherds, as we have seen, are not at all distinctive, as majority of Indian pottery is; the haematite pieces may have got the polish because of constant rubbing, and not intentional polishing. For dating the earlier phase the Microlithic evidence is not sufficient nor specific. What it indicates in brief is, if we are to judge from the quantity and quality of finds viz., the relative stratigraphic context, granting that many microliths from the upper levels have not been washed away, that the best period of occupation of the mounds was, if it can be said so, was that which coincided with levels 3 to 4 or 5.[218] The finds from these levels are not only more, but varied, consisting of cores, large flakes, lunates and other blades. The amount of bone splinters is also large from these levels.

In spite of the fact that this Gujarat culture possesses a few features of the Neolithic civilisation, and a few of the Mesolithic, particularly bone tools, the existence of which in Europe implies the bone tradition, "the third industrial element of the mesolithic civilisation,"[219] still it may be merely called

215 CLARK, *ibid.*, pp. 190, 192 and fig. 65 (map); the loess belt does not give any trace of settlement. However the Tardenoisians did settle on high rocky regions. What they seemed to avoid were dense forest, for felling which they had no equipment.

216 Often without any stratigraphical context, merely on surface. Still these tools, since they resemble those obtained from the few mesolithic sites, are regarded by CLARK (*Britain*, p. 19) as belonging to the Mesolithic Age.

217 Or early Neolithic, as the Campignian Culture, first found at Campigny in France, was called under the old classification. It is now called Mesolithic. BURKITT, *Our Early Ancestors*, pp. 45-46.

218 In this connection the analysis of soils (see APPENDIX III) from the two levels at Hirpura and Langhnaj may be consulted. According to recent tests the amount of phosphoric acid in soil shows whether a site was previously inhabited or not. cf. *Antiquity*, 1941, p. 382. As said therein the principal elements by which the soil of a settlement is enriched viz., nitrogen, potash, magnesium, lime and phosphoric acid are to some extent there. But until samples of soils from other parts of Gujarat are similarly examined, nothing definite can be said from these analysis except the existence of a dry climate.

219 CLARK, *The Mesolithic Age in Britain*, p. 9

"Microlithic"[220], in the absence of definite stratigraphical evidence, antidating probably the historic[221] and proto-historic and perhaps of a prehistoric period. What its exact character is will be very likely revealed by further excavations at Langhnaj[222] and similar other sites in Gujarat.

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220 It cannot be exactly compared with the upper Capsian or the inter Capso-neolithic, as in the latter neolithic elements like the saddle quern and perforated digging stones occur, while in the former, the microliths become geometric in form. LEAKEY, *Stone Age Africa*, p. 107.

221 In spite of GORDON'S and BURKITT'S view cited above (p. 140). For, in the first place there is neither stratigraphic nor cultural relationship between the paintings and microliths. Even if the latter are of the same age as the former, the Mahadeo Hill evidence cannot be a rule for all India. Most important, however, is the fact that the Gujarat bone remains are much more calcified than those found at Mohenjodaro, Harappa, Nal and those found by De TERRA at Uchali, west of Naushahra, in the Salt Range, Punjab (as would appear from the description of their state of preservation.)

222 The writer is glad to note that the view expressed here has been corroborated to a great extent by subsequent excavations carried out by him at Langhnaj. Besides microliths and bone splinters, numerous skeletal remains of large animals, perhaps some of them now extinct in Gujarat, and human skeletons, all mineralized (calcified), have been found. This year a large drilled quartzite ring and a small polished celt-like object of chlorite schist were also discovered. The human beings are of dolicocephalic type and appear akin to proto-Egyptians and people of north-east Africa. For details see *New Indian Antiquary*, Vol. VI, April, 1944, and *Preliminary Report on the Third Gujarat Prehistoric Expedition, Poona, 1945*.

APPENDIX I

Catalogue of Surface Microlithic Finds

(Explanation of abbreviations used in the catalogue)

Bulb	=	Conchoid bulb of percussion.
Large	=	Large size. Two inches and over two inches in length.
Med.	=	Medium size. Below two inches and over one inch.
Sm.	=	Small size. Less than an inch and over half an inch.
V. Sm.	=	Very small. Less than half an inch.
‖		Parallel flake scar.
Mtd.	=	Mottled.

HIRPURA, KĀSHÉḌIO ṬIMBO (Symbol 'H')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
1	H	Core	irregular with flat semi-circular base; upper surface well flaked with 2 or 3 large facets; underside roughly flaked.	Large.	Quartz,	dirty white.	
2	"	"	roughly conical with vertex truncated; four flakes on face.	Med.	"	"	
3	"	"	conical, rounded top; base roughly flaked; almost all sides well flaked.	"	"	"	
4	"	"	pyramidal, nearly circular base; roughly flaked.	"	"	"	
5	"	"	flat and ovoid, flaked base and face.	"	"	"	
6	"	"	irregularly trapeziod; flaked all over except on one side.	"	"	"	
7	"	"	rectangular, steep ridge on face, flaked all over.	"	Chert,	flesh.	

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
8	H	Core,	irregular ovoid; neatly trimmed all over; at least 5 flakes.	Med.	Chert,	mtd. pinkish & cream.	
9	"	"	roughly rectangular; two neat flakes and scars on one side.	"	"	pink.	
10	"	"	ovoid; the face flaked as to form a bevelled edge by intersection with the flaked back.	"	"	waxy.	
11	"	"	roughly circular, convergent flaking on both surfaces; on the lower it is fresh, upper patinated into brownish yellow.	"	"	brownish,	
12	"	"	irregular shape, sharp, bevelled edge; flaked all over.	"	"	dull brown.	
13	"	"	irregular rectangular; uneven steep ridge on face; flaking very rough; no edges.	"	"	purplish & dull black with whitish inclusions.	
14	"	"	triangular, with sharp irregular sides, and base; rounded point; flaked all over.	"	"	Mtd. snuffy with black tints.	
15	"	"	nearly quadrantal having a bevelled edge; roughly flaked all over.	"	"	variegated shades of red.	
15 A	"	"	irregular shape, no edges; flaked all over except for a small patch of brownish cortex; face has 3 parallel flake scars.	"	"	brownish.	
15 B	"	"	oblong; one side neatly trimmed (5 flakes), vertex flaked into an obliquely straight and sharp edge.	"	"	greyish white.	
15 C	"	"	oblong; well and neatly trimmed; no edges	"	"	flesh.	
15 D	"	"	nearly semi-circular; trimmed on both sides; no edges; at least 4 flakes.	"	"	"	

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16	,,	Flake,	elognated semi-ovoid; steep midridge on face; two-edged.	Large,	,,	,,
17	,,	,,	pointed ovoid; ridge on face; bulb & platform; sharp edges, notched on one side.	Med.	,,	,,
18	,,	,,	elongated quadrant, arc forms sharp edge	,,	,,	,,
19	,,	,,	elongated ovoid with obliquely truncated point; face has a side ridge; only one side-edge, sharp and sinuous.	,,	Quartz,	white.
20	,,	,,	oblong with one end bevelled and the other slightly pointed; one sharp side edge.	Sm.	Chert,	flesh.
21	,,	,,	oblong with one point curved; midridge on face; bulb; edges sharp, one of which is convex and the other concave, having thin body.	,,	,,	light flesh.
22	,,	Blade,	oblong; all sides angular but one, which forms edge.	Sm.	Chert,	flesh.
22 A	,,	,,	oblong with one end polygonal; thin; mid-ridge on face, marked by a parallel flake scar; bulb, sharp edges.	,,	,,	light pink.
22 B	,,	,,	eagle-beak-like; ridge on face flaked; back with bulb; curved at the point; sharp edges.	Med.	,,	chocolate.
22 C	,,	,,	ovoid with truncated point; low ridge on face; one side edge.	,,	Quartz,	white.
22 D	,,	,,	obliquely truncated semi-ovoid; one side thicker, the other sloping, a part of which forms edge; flattish.	,,	,,	,,
23	,,	,,	nearly trapezoid; face has an irregular side ridge; sinuous edges.	,,	Chert,	mixed shades of grey brown and white.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
24	H	Blade,	rectangular; one end narrower, slight mid-ridge on face, only one edge sharp.	Large.	Quartz,	greyish white.	
24 A	,,	,,	rectangular; one side thicker; other sloping with sharp irregular edge.	,,	Quartzite,	chocolate.	
25	,,	Scraper,	semi-oval; face has a parallel flake scar; two-edged, one of which is irregular.	Med.	Chert,	mtd. whitish and grey.	
26	,,	,,	roughly trapezoid; other details as in No. 25.	,,	,,	light brownish.	
27	,,	Blade,	elongated ovoid with one point truncated; the sides near which are sharp; flattish.	,,	Quartz,	white.	
28	,,	Flake,	Scraper (?), nearly amygdaloid; ridge on face; bulb & platform; one side edge a little irregular and the other very finely serrated.	Large.	Chert,	light grey.	
29	,,	,,	Blade (?), semi-amygdaloid with obliquely truncated point; flattish face partly ridged; rest roughly flaked.	Med.	Chert,	light snuff.	
30	,,	,,	Blade (?), nearly square; (perhaps part of a blade); parallel flake scars on face; one sharp side-edge.	Sm.	,,	dark red.	
31	,,	,,	nearly square; one corner pointed.	,,	Quartz,	white.	
32	,,	,,	semi-ovoid; thin and flat; three neat parallel flake scars on face; two sharp side-edges; (perhaps part of a blade).	,,	Chert,	rosy pink.	
33	,,	Blade,	truncated ovoid; very thin and flat; one side-edge.	,,	Chalcedony,	waxy white.	
34	,,	,,	semi-ovoid; bulb (?), one side edge.	,,	Quartz,	white.	

35	,,	,,	segment of circle (elongated); cortex, partly worked-back; sharp edge on one side	,,	Chalcedony,	reddish.
36	,,	,,	segment of circle, with one point truncated; on edges; roughly flaked.	Med	Chert,	,,
37	,,	,,	crescentic, thick back, partly worked; slightly concave sharp edge.	,,	Chalcedony,	,,
38	,,	Scraper,	segment of circle with an obliquely truncated point; thick worked back; straight sloping edge.	,,	Quartz,	white.
39	,,	,,	convex polygonal (six sides), only one narrow side has irregular edge.	,,	Chert,	dark grey.
40	,,	,,	segment of circle with one truncated point; side edges rounded on one side.	,,	,,	flesh.
41	,,	,,	amygdaloid with obliquely truncated point; mid-ridge; thick flaked back, one edge sinuous	,,	Quartz,	white.
42	,,	,,	crescentic; thick worked back, straight and sharp edge.	Sm.	,,	,,
42A	,,	,,	ovoid with irregular sides; convex, partly cortexed thick back; gently sloping and irregular side-edge.	Large	Chert,	veined light grey.
42B	,,	,,	trapezoid; smooth flat on face with flaked sloping sides; back has a bulbar scar with shatter lines; well trimmed edge.	Med.	Jasper,	terracotta like.
42C	,,	,, (?)	crescentic with one obliquely truncated point; flat, parallel flake scar on face; bulb and platform; straight side has a sinuous and curved side has an irregular edge.	,,	Chert,	specky light grey.
43	,,	,,	triangular with rounded corners; one side has edge.	,,	Quartz,	white.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
44	H	Scraper,	crescentic; two side edges.	Med.	Chert,	specky dark grey.	
45	"	"	quadrantal; two sides flat and one has steep edge.	"	Chalcedony,	reddish white.	
46	"	Point (?),	rhombic with one truncated point; incurved back; point broken.	Sm.	Chert,	Mtd. chocolate.	
47	"	Scraper,	quadrantal; thick, angular back, convex edge.	"	Quartz,	white.	
48	"	"	obliquely truncated sub-oval; thick angular back; one side-edge.	"	"	"	
49	"	"	quarter of an oval; worked, bevelled back; two main flake scars on the upper surface; the flatter and broader of which has a sharp edge near the point.				
50	"	"	crescentic; thick worked-back; no clear edge.	Med.	Chalcedony,	pinkish.	
51	"	"	quarter of an oval; pyramidal; curved side blunted; sharp edge on the other.	Med.	Chalcedony, mtd.	grey & reddish.	
52	"	"	sector of sphere; high mid-ridge; smooth underside; edge sharp.	"	Chert,	greyish white.	
53	"	"	quadrantal; angular blunted back; sharp convex edge.	Sm.	Quartz,	white.	
54	"	"	(Blade?), trapezoid; flattish; erased bulb; three sides blunt and fourth forms straight edge.	"	Chert,	brownish.	
55		Blade,	ovoid; blunted back; sharp curved edge.	Med.	Carnelian,	flesh.	
56	"	"	semi-ovoid; one side edged and others blunt.	V. Sm.	"	pink.	

57	,,	Scraper,	or Blade (?), semi-ovoid; perhaps part of a broad blade, having one side, blunted, the other sharp, well-worked.	Med.	Chert,	dark grey.
58	,,	,,	roughly convex polygonal; no well marked edges.	,,	,,	chocolate.
59	,,	,,	semi-circular; flat with equal thickness; blunt around.	,,	Quartz,	white.
60	,,	,,	triangular with rounded sides; sharp edge on one side.	,,	,,	brownish white.
61	,,	,,	nearly circular, face roughly trimmed, leaving a part of the cortex; bulb curved and sinuous edge.	Large,	Carnelian,	dark red.
62	,,	,,	nearly square with truncated corners; face roughly trimmed; back has conchoid of purcussion and a bulbar scar. The main sharp edge has a hollow, perhaps by use.	,,	,,	brownish.
63	,,	,,	semi-ovoid; both surfaces flaked roughly; edge along arc.	Med.	Chalcedony,	dull milk white.
64	,,	,,	amygdaloid; face slightly conical; curved edge.	Large,	Chert,	reddish.
65	,,	,,	quadrantal; face has 3 parallel flake scars; edges on 2 sides.	,,	Quartz,	white.
66	,,	,,	roughly ovoid; face has parallel flake scars; one side-edge, conchoid of percussion on back.	Med.	Carnelian,	flesh.
67	,,	,,	bean-shaped; face well trimmed; bulb & platform; sinuous age.	,,	Chert,	veined pink.
68	,,	,,	truncated ovoid; irregular flaked ridge on face; bulb and platform; sharp edges.	,,	,,	pinkish with darker inclusions.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
68A	H:	Scraper,	amygdaloid; biconical, one side of which is very finely trimmed; sharp edge around; fine specimen.	Med.	Chalcedony,	brownish.	
68B	"	"	amygdaloid; obliquely truncated point; face trimmed by "fluting" technique; back has bulb and platform; sharp edges on two sides.	"	"	light brown.	
69	"	"	semi-ovoid; face rounded; edges on all but one side.	"	Quartz,	white.	
70	"	"	nearly circular; face has a few parallel flake scars, a patch of the cortex on one end; bulb, convex irregular edge.	"	Chert,	speckled flesh.	
71	"	"	semi-ovoid, mid-ridge; bulb; sharp edges on sides.	Sm.	Carnelian,	rosy pink.	
72	"	"	trapezoid; face roughly pyramidal, and flaked; edges on 2 sides.	"	Quartz,	nearly pure.	
73	"	Blade (?),	semi-ovoid with oblique chord; flattish; sharp, fine, sinuous edge.	"	Chert,	light-pink.	
74	"	Scraper (?),	quadrantal; face well trimmed in parallel flake scars; back unworked and represents the patinated surface of the original nodule; convex, irregular sharp edge.	Large,	Sard,	brownish.	
75	"	Scraper,	triangular with a truncated corner; flattish; edge sharp and irregular on two sides.	Large.	Chert,	brown.	
76	"	Point (?),	broad leaf-shaped; face roughly flaked; bulb; and platform; edges on two sides one of which is slightly blunted and incurved; sharp point.	Med.	"	mtd. grey, ivory and pink.	

77	,,	,,	semi-ovoid; flattish; face well trimmed; bulb; fairly sharp point and sides.	Sm.	,,	flesh.
77A	,,	Blade (?),	trapezoid; rather flattish; face smoothly trimmed; erased bulb; all sides but one have sharp edges.	Med.	Carnelian,	light pink.
77B	,,	Scraper,	trapezoid; roughly flaked face; well cut edge.	,,	Jaspery Chert,	dark red.
78	,,	Flake (thick),	triangular; face has a high protuberance, half of which sloping gently towards the edge; the other has 4 well made flake scars; point thick and dull.	,,	Chert,	pinkish brown.
79	,,	Point (?)	pointed, quadrantal; plain face and sides; back has brown cortex; screw driver-like point.	,,	,,	dark red.
80	,,	,,	trapezoid; prismatic; back as in No. 79; lower half tapers suddenly to form a point.	,,	Carnelian,	brownish red.
81	,,	,,	sub-triangular, with elongated point, which retains part of the cortex.	,,	Chert,	brownish.
82	,,	,,	sector of sphere, curved edge, with a slightly protruding point.	,,	Quartz,	
83	,,	,,	trapezoid, sides irregular and uneven; point thick but sharp.	,,	Chert,	brownish pink.
84	,,	Point,	nearly quadrantal; partly flaked face; sharp point.	,,	Quartz,	
85	,,	,,	trapezoid; face somewhat pyramidal, marked by convergent flake scars; point truncated.	,,	Sard,	brownish.
86	,,	,,	triangular; prismatic; point sharp.	Sm.	,,	,,
87	,,	,,	trapezoid; face has apatch of lime incrustation; sharp point and edges.	,,	Chert,	mtd. whitish & red.

Serial No.	Site	Antiquity Micro	Description	Size	Material	Colour	Remarks
88	H	Point,	triangular with one truncated corner; thick sharp point.	Sm.	Sard,	yellowish light brown.	
89	„	„	(?), quadrantal; bulb; one side has a "folded" surface; sharp point.	„	Chert,	dark brown.	
90	„	„	trapezoid with an incurved and pointed side; thin and very sharp point.	„	Quartz,		
91	„	„	nearly parrot-beak-shaped; curved point.	„	Chert,	veined milky white.	
92	„	„	triangular; flat and thin; broken point.	„	Quartz.		
93	„	„	trapezoid; mid-ridge, well pointed.	„	Sard,	brown.	
94	H (NE)[1]	Scraper,	trapezoid; thick with a sloping surface.	Med.	Quartz,	milky.	
95	„	Blade,	rectangular parallel flake scars on face; sharp incurved edge.	„	„	„	
96	„	Scraper,	truncated ovoid, flattish; sharp sloping edge.	„	„		
97	„	„	trapezoid with three corners rounded; flattish; neatly trimmed face, sharp edge.	„	Chert,	brownish.	
98	„	Blade,	semi-ovoid, flattish; parallel flake scars on face; sharp side edges.	Sm.	„	rosy pink.	
99	H	„	pruning knife-like; delicate; transverse ridge; sharp side-edges.	V. Sm.	Chert,	pinkish.	
100	„	„	oblong; parallel flake scars on face; well formed side-edges.	„	Cachalong,	milk white.	
101	„	Point (?),	subtriangular, flattish, sharp point.	Sm.	Quartz,	milky.	

1 See *above* "Exploration of Microlithic sites" p. 51.

102	H	Point (?)	trapezoid; screw-driver-like point, no edges.	Med.	Chert,	mtd. whitish and purplish.
103	,,	Scraper.	roughly crescentic; flattish, sigmmoid edge neatly trimmed and somewhat serrated.	,,	Sard,	light brown.
			HIRPURA, GHADHARA PLATEAU (SYMBOL 'HD')			
104	HD	Core,	like a tetrahedron, very irregular and coarse flaking.	Large,	Jasper,	chocolate.
105	,,	,,	pointed oval, very rough and irregular flaking.	,,	Chert,	mtd. reddish brown.
106	,,	,,	roundish; cortexed base with bevelled face, showing fan-wise flaking, 12 flakes.	,,	,,	banded brown with reddish tint.
107	,,	,,	semi-circular; the arc forming an irregular sharp edge.	,,	,,	mtd. deep red with grey specks.
108	,,	,,	roundish, flat-bottomed; coarsely flaked all over.	,,	,,	mtd. deep brown and white.
109	,,	,,	semi-circular; thick and flat base; bevelled irregular edge.	,,	,,	milky white with purplish specks.
110	,,	,,	irregular, flat base; 7 flake scars.	,,	,,	light purple.
111	,,	,,	semi-oval, rough flaking.	Med.	,,	mtd. pinkish and brown.
112	,,	,,	sector of sphere; flat base; two flake scars.	,,	Jaspery Quartzite,	deep brown.
113	,,	,,	quadrantal, with the arc as its bevelled edge.	,,	Quartz,	
114	,,	,,	irregular.	,,	Chert,	pinkish.
115	,,	,,	convex polygonal, with face flaked.	,,	Agate,	milky white.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
116	HD	Core,	irregular, with bevelled edge, flakes on both sides.	Med.	Agate,	mtd. purple and black.	
117	,,	,,	truncated ovoid; coarsely flaked all over.	,,	Lydiun,		
118	,,	,,	irregular.	,,	Chert,	whitish.	
119	,,	,,	resembles upper portion of 'lady's finger'; face well worked showing 6 parallel flake scars.	Large,	,,	white with shades of pink.	
120	,,	Blade,	elongated, semi-oval ridged blade, curved; bevelled point, thick or high at the other end, well flaked sides; edge on left sharp and regular; that on the right has concavities due to retouch(?), and a patch of cortex near the point.	V. Large,	Chert,	light pink.	According to a certain definition of a microlith this implement may not be called a microlith.
121	,,	,,	celt-like, with bevelled convex edge, having a small notch on the left; rest ridged, left side retaining the original rough cortex; side-edges sharp.	Large,	,,	pink.	
122	,,	,,	trapezoid; prismatic; face has one flake scar, one side-edge flat and other sharp; underside has a fine conchoidal bulb.	,,	,,	mtd. grey, white and blackish.	
123	,,	,,	elongated-oval; prismatic; the face roughly flaked, one end retains original cortex; sharp edges, side-edges evenly curved.	,,	Jaspery Quartzite,	deep purple.	
124	,,	,,	long and irregular; flaked all over; one side-edge.	,,	Chert,	light purple with deep coloured vein.	

125	,,	,,	segment of sphere; all sides edged.	,,	,,	pinkish with red veins and stains.
126	,,	,,	rectangular with tilted body having a gouge-like, bevelled edge with secondary chippings.	,,	,,	mtd. pink and milky white.
127	,,	,,	rectangular, slightly thick at one end, the other thin, sloping and sharp angular edge; sides flat.	Med.	,,	milky white.
128	,,	,,	rectangular, one end narrower with slightly tapering sides. No working edges.	,,	,,	light purple.
129	,,	,,	long, but irregular in outline, one side-edge having a concavity in the middle.	,,	,,	mtd. pink and milky white.
130	,,	,,	roughly rhomboidal, with two irregular side edges.	Large,	,,	pink with reddish intrusions.
131	,,	,,	elongated and obliquely truncated oval; transverse ridge, one blunt side-edge.	,,	,,	pink.
132	,,	,,	rectangular, one half of the face has a steep ridge, the other half has a sloping surface; one side edge.	Med.	,,	mtd. violet.
133	,,	,,	elongated and obliquely truncated oval; face has a bifurcated ridge; bulb; side edges sharp.	,,	,,	pink.
134	,,	,,	elongated oval with points truncated; central part of upper surface has mid-rib; only one wavy side edge.	,,	,,	light pink.
134a	,,	,,	nearly rhomboidal; small bulb on surface; ridged; side edges sharp.	,,	,,	light grey.
134b	,,	,,	oblong; ridged, one side further flaked, edge on one side sharp.	,,	,,	greyish.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
134c	HD	Blade,	irregularly elongated ridged; all sides sharp.	Med.	Chert,	chocolate.	
134d	,,	,,	isoceles trapezoid; low ridge; sharp sides.	,,	Quartz,		
134e	,,	,,	elongated ovoid with an angular truncated point, low sloping ridge.	Sm.	Chert,	light pink .	
134 f	,,	,,	irregularly elongated, slightly ridged, rest flat, no edges.	,,	,,	violet.	
134 g	,,	,,	oblong.	,,	,,	pinkish yellow.	
134 h	,,	,,	semi-ovoid, ridged, edges blunt.	,,	Quartzite,	pinkish.	
134 i	,,	,,	scalene triangular, truncated point; edge on one side.	,,	Chert,	light blue.	
134 j	,,	,,	oblong, the body slightly twisted.	V. Sm.	,,	yellowish red.	
135	,,	,,	pointed, triangular, face partly ridged; rest deeply flaked; no edges, dull point.	Large,	,,	mtd. milky white with chocolate veins.	
136	,,	,,	long, narrow and pointed; ridged; side edges not sharp.	,,	,,	violet.	
137	,,	,,	long, narrow and flattish, one side rounded; side edges sharp.	,,	,,	light purple.	
138	,,	,,	long, pointed curved body; face well flaked; edge sharp, point rounded.	Med.	,,	brown.	
139	,,	,,	long, flattish; a sharp curved side edge.	,,	,,	yellowish pink.	
140	,,	,,	elongated crescentic; flat flake scar over face; one end upturned, side edges sharp.	,,	,,	mtd. pinkish & yellowish.	
141	,,	,,	semi-oval; sloping surface; edge serrated.	,,	,,	pinkish.	

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142	,,	,,	trapezoid; steep side ridge; side edges sharp.	,,	,,	mtd. light brown & white.
143	,,	,,	rectangular, one end narrower; ridge irregular; edge on one side sharp but irregular.	,,	,,	mtd. light brown & white.
144	,,	,,	rectangular with one end upturned; ridge flaked; side edges sharp.	,,	,,	(translucent) whitish.
145	,,	,,	rectangular, irregular; ridged; edges uneven but sharp.	,,	,,	white.
146	,,	,,	trapezoid: face flaked; bulb on under surface; edges sharp on one side.	,,	,,	light pink.
147	,,	,,	trapezoid, face flattish, flaked, narrower end sharp; one side edge irregular, deeply indented, face has a parallel flake scar on one side; bulbar scar on under surface.	,,	Jasper,	deep brown.
148	,,	,,	trapezoid; edge serrated.	,,	,,	deep chocolate.
149	,,	,,	irregular rectangular with curved sides; face flaked; edges sharp.	,,	Chert,	mtd. cream with chocolate bands.
150	,,	,,	ovoid, one end truncated; flattish; the face has parallel scars; side edges sharp; point rounded and blunt.	,,	Carnelian,	light brown,
151	,,	,,	pointed ovaloid; worked-back, edge uneven but sharp.	,,	Chert,	purplish.
152	,,	,,	convex polygonal, curved sloping ridge on face; three sides sloping and having sharp edges.	,,	,,	mtd. dull white with red veins on the upper half.
153	,,	,,	quadrantal, thin and flattish; face well flaked; bulb on undersurface; edges sharp.	,,	,,	greyish purple.
154	,,	,,	quadrantal, similar to No. 153.	Sm.	Quartz,	

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
155	HD	Blade,	pointed semi-oval; face flaked on one side and near the point; point and side edges sharp.	Sm.	Chalcedony,	(translucent) dull white.	
156	,,	Scraper,	(Blade?), crescentic, cortex on arc; chord side half broken; rest sharp.	Large,	Chert,	mtd. dark grey & white.	
157	,,	Blade (?),	crescentic; very roughly worked; no sharp edges.	,,	Haematite,		
158	,,	,,	crescentic; cortex on chord side, partly deeply notched near the curved end; rest as if serrated and sharp: the butt or broad end faceted.	,,	Chert,	dark grey with brownish bands.	
159	,,	Blade,	crescentic, arc side roughly flaked, secondary chipping on chord edge, which is sharp and irregular.	,,	,,	mtd. white, pink brown.	
160	,,	,,	crescentic, cortex on arc, blunt edge.	Med.	,,	light grey with purple specks.	
161	,,	,,	crescentic, roughly worked arc; with sharp edge on incurved chord.	,,	,,	mtd. brown & dull white.	
162	,,	,,	crescentic, elongated, worked-back or arc; concavities on chord–side edge.	,,	,,	light purple.	
163	,,	,,	crescentic, thin, sloping face; curved ridge; arc and chord edges sharp.	,,	,,	pink.	
164	,,	,,	crescentic, uniformly flattish, face flaked.	,,	,,	brown with darker bands.	
165	,,	,,	crescentic with no edge.	,,	,,	snuff.	
166	,,	,,	crescentic, worked-back; chord side sloping and sharp edged.	,,	,,	pinkish.	

167	,,	,,	crescentic, ridged; on sharp edger.	,,	,,	light brown.
168	,,	,,	irregularly crescentic: worked-back; steep sloping chord side, sharp edge.	,,	,,	light pink, with darker veins.
169	,,	,,	irregularly crescentic; worked-back; sharp uneven edge.	,,	,,	light black.
170	,,	,,	crescentic, flattish; worked-back and face, edge sharp.	;,	,,	whitish with pink bands & specks.
171	,,	,,	crescentic, back mostly with cortex, rest flaked; face flaked with sloping chord side; edge sharp.	,,	,,	violet.
172	,,	,,	triangular; ridged; cortax on one side, rest flaked; edge sharp.	,,	,,	reddish.
172 A	,,	,,	crescentic; worked-back· chord side edged.	Sm.	,,	purplish.
172 B	,,	,,	Do.	,,	Quartz,	
172 C	,,	,,	Do.	,,	,,	
173	,,	,,	crescentic, very elongated, Do.	,,	Chert,	whitish with darker shades.
174	,,	,,	crescentic partly ridged; sharp edge on chord.	Med.	,,	brownish.
175	,,	Scraper,	(Blade ?), crescentic; cortex on arc; chord sharp edged.	,,	,,	,,
176	,,	,,	crescentic; back and face roughly flaked; slightly concave edge on chord.	,,	,,	light brown.
177	,,	,,	crescentic, face flaked; on clear edge.	Sm.	,,	greenish.
177 A	,,	,,	(Blade ?) crescentic, flattish; concave, sloping edge.	,,	,,	light pink.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
177 B	HD	Scraper,	crescentic, sharply pointed at one end; no clear edge.	Sm.	Chert,	whitish.	
177 C	,,	,,	crescentic, Do.	,,	,,	mtd. pink & white.	
177 D	,,	,,	crescentic, angular, roughly worked-back; straight sloping edge.	,,	,,	white.	
177 E	,,	,,	crescentic; smooth back; sharp, sloping edge.	,	,,	red.	
178	,,	,,	roughly rectangular; steeply flaked sides, leaving a smooth, dark brown cortex on the top, underside flaked; no clear edges.	Large,	Jasper,	brown.	
179	,,	,,	trapezoid, face has an irregular ridge; no clear edge.	,,	Quartzite,	reddish.	
180	,,	,,	side-scraper (?) rectangular with one side uneven; bevelled sharp edge, marked by secondary chipping on one shorter side.	,,	Chert,	mtd. pinkish and brownish.	
181	,,	,,	nearly circular; flaked all over, on both sides; edge on one shorter side steep and regular.	,,	Jasper,	brown with lighter tints.	
182	,,	,,	rectangular, with one side rounded; flattish, broad sloping platform on face; bulb of percussion on underside; sharp irregular edges.	,,	Chert,	pinkish white.	
183	,,	,,	rectangular with one side rounded; the opposite side sloping and sharp-edged.	,,	,,	graded shades of pink.	
184	,,	,,	trapezoid, with sharp edges.	,,	,,	brownish grey with milky white specks.	

185	,,	,,	convex polygonal (5 sides); sharp sloping edge on one side.	Med.	,,	light blue with yellow tints on face.
185A	,,	,,	circular; thin body; shapely.	Sm.	,,	violet with white specks.
186	,,	,,	crescentic, ridged; broad, sloping platform with no edge; sharp edge on the convex side.	,,	,,	light pink.
187	,,	,,	crescentic, steep sloping convex side with sharp edge.	,,	,,	mtd. white brown and grey.
188	,,	,,	crescentic but angular; face presenting several facets, sharp edge on all sides.	,,	,,	white with grey.
189	,,	,,	crescentic, convex back partly flaked; rest has cortex; sharp edge on two sides.	Med.	,,	orange and white.
190	,,	,,	crescentic; neatly worked all over; sharp edge on convex side.	,,	,,	pinkish.
191	,,	,,	pointed oval, broad face having a slight ridge; sharp bevelled edge on two sides.	Large,	,,	mtd. dark grey and white.
191A	,,	,,	crescentic; convergent flake scars on face; sharp edge on convex side; well worked and shapely.	Med.	,,	green stone.
191 B	,,	,,	semi-oval; steep sloping sides with no clear edge.	Large,	,,	graded shades of pink.
192	,,	,,	convex polygonal (7 sides) with flat thin body; rough flaking on face; bulb on under side.	,,	Jaspery Quartzite,	chocolate.
193	,,	,,	rectangular; roughly flaked on face, no clear edge.	Med.	Chert,	light black.
194	,,	,,	elongated polygonal with five parallel flake scars on face; one side concave, rest convex.	,,	,,	pink.

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Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
195	HD	Scraper,	obliquely truncated ovoid with sharp wavy edges.	Med.	Chert,	grey-brownish.	
196	”	”	rectangular; thin flat body; sharp sloping edges on shorter sides.	”	”	brownish with light black shades.	
197	”	”	semi-ovoid; thin body with a projecting corner; well trimmed on face; sharp edges.	Sm.	”	deep red.	
198	”	”	crescentic; broad face with fine convergent flake scars; bulbar scar; sharp edges on two sides.	”	”	light brown.	
199	”	”	rectangular; slightly ridged with broad sloping platforms, sharp irregular edges.	Med.	”	mtd. dull white and red.	
200	”	”	elongated semi-oval; sharp edges.	”	”	pinkish.	
201	”	”	pointed-ovoid; face has a parallel scar and sloping sharp edged sides; bulb on under surface.	”	”	pink.	
202	”	”	semi-ovoid with obliquely truncated point; ridged; sharp edge.	”	”	mtd. purplish.	
203	”	”	truncated oval; face irregularly flaked; one shorter side has a bevelled edge.	”	”	white.	
204	”	”	roughly square, with a back having an originally undulating surface; sharp edges on two sides.	”	”	variegated blackish and light grey.	
205	”	”	nearly square with one corner elongated and pointed.	”	”	grey, mtd. black and grey.	
206	”	”	irregular quadrilateral; sharp slightly concave edge on one side.	”	”	brown with beautiful red veins.	

207	,,	,,	rectangular, one corner elongated; face has a neat parallel flake scar; sharp edge on one side.	,,	,,	brownish with pink specks.
208	,,	,,	Do.	,,	,,	whitish with darker veins.
209	,,	,,	nearly circular with one side truncated; thin, slightly conical; sharp edge almost around.	,,	,,	dark grey.
210	,,	,,	semi-ovoid; face trimmed; sharp edge on one side.	,,	,,	brownish.
210 A	,,	,,	triangular; cortex on base; neat parallel flake scar on face; sharp sloping sides.	,,	,,	white.
210 B	,,	,,	triangular, trimmed at the base.	,,	Quartz,	
210 C	,,	,,	convex-polygonal (5 sides), with thin body; sharp concave edge on one side.	,,	Chert,	milky white.
210 D	,,	,,	irregularly convex-polygonal; thin sharp edged on two sides.	,,	,,	whitish pink.
210 E	,,	,,	truncated oval; ridged; edge on one side.	,,	Quartz,	
210 F	,,	,,	ovoid. Do.	,,	,,	
210 G	,,	,,	crescentic; sharp concave edge on the inner side.	,,	Chert,	mtd. whitish and yellow.
210 H	,,	,,	convex polygonal; thin; no clear edge.	Sm.	,,	chocolate.
210 I	,,	,,	truncated ovoid; thin, flat; face neatly trimmed; sharp edges on 2 sides.	,,	,,	white.
210 J	,,	,,	trapezoid, as No. 210 I.	,,	,,	brownish purple.
210 K	,,	,,	obliquely truncated ovoid; thin, flat, sharp on one side.	,,	,,	blue.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
210 L	HD	Scraper,	convex polygonal; thin, flat; with wavy edges.	Sm.	Chert,	pinkish.	
210 M	,,	,,	rectangular; one end rounded, ridged; sloping sharp-edged sides.	,,	,,	pink.	
210 N	,,	,,	truncated–conical; steep sloping sharp edged side and point.	,,	,,	salmon.	
210 O	,,	,,	square well trimmed face.	,,	,,	purplish.	
210 P	,,	,,	oblong with one corner projected, and sharp edged.	,,	,,	light brown.	
210 Q	,,	,,	oblong, face well trimmed; sloping side with sharp edge.	,,	,,	slate.	
210 R	,,	,,	trapezoid; ridged; rounded and sharp edged at top and also on one side.	,,	,,	whitish.	
210 S	,,	,,	roundish & flat; face has convergent scars; sharp edges on two sides.	,,	,,	mtd. pink & purple.	
210 T	,,	,,	polygonal (four convex and one concave side) thin; sharp wedge–shaped end.	,,	,,	brownish pinky.	
210 U	,,	,,	irregular; sharp concave edge.	,,	Quartz,		
210 V	,,	,,	convex polygonal (5 sides), very thin and fine.	V. Sm.	Chert,	light red.	
210 W	,,	,,	convex polygonal (5 sides, all are rounded but one), back flaked; face has a high sloping ridge; edge of the broader side is straight with a few concavities.	V. large,	,,	reddish brown.	
211	,,	Point (?),	triangular; sharp edges on two sides.	Large,	,,	dull white.	

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212	,,	gouge-like (?)	sub-rectangular, one end sharply acute-angled.	,,	,,	pinkish.
213	,,	,,	pointed oval, cortex on one face.	,	,,	mtd. grey & deep red.
214	,,	Scraper or Point (?)	trapezoid; uniformly thick sides, two ending in a point.	Med.	,,	pinky brownish.
215	,,	,,	triangular; two sides meeting in a sharp point.	,,	,,	yellowish.
216	,,	,,	sector of circle (about 50°), thin, and flat; edge is well serrated and slightly sygmoid in outline with a pointed end.	,,	Chalcedony,	milky white.
217	,,	,,	amygdaloid; ridged; two sides meet in a sharp point.	,,	,,	greyish.
218	,,	,,	rectangular; one corner projected, ridged, sharp sides and pointed.	Sm.	Chert,	reddish.
219	,,	,,	amygdaloid, like No. 217.	,,	,,	purplish.
220	,,	,,	trapezoid, two sides meet in a point.	Med.	,,	mtd. grey and milky white.
221	,,	,,	sub-triangular; thick, flaked base; sharp sloping point (arrow-head?)	,,	,,	grey.
222	,,	,,	tetrahedron, with well-shaped sharp point.	,,	,,	greyish white.
223	,,	,,	triangular; crudely flaked on both faces; two sides meet in a point.	,,	,,	pinkish.
224	,,	,,	segment of circle; trimmed on all sides, two of which meet in a fine sharp point.	,,	Chalcedony,	transparent white.
225	,,	,,	sector of circle (about 110°); sharp edge on one side.	,,	Chert,	greyish.

Serial No.	Site	Antiquity Micro	Description	Size	Material	Colour	Remarks
225A	HD	Scraper or Point (?)	crescentic; ridged; sharp convex edge and point.	Med.	Chalcedony,	milky white.	
225B	"	"	triangular; uniformly thin edges and point sharp.	"	Chert,	mtd. purple with milky stains.	
225 C	"	Point,	pear-shaped, face has two platforms, one of which is well flaked: the other has a sharp wavy edge.	"	"	greyish.	
225 D	"	Blade,	pointed oblong; ridged; fairly sharp point and side.	"	Quartzite,	purplish.	
225 E	"	"	curved knife-like; ridged; sharp point and side.	"	Chert,	light pink.	
225 F	"	"	pointed-oblong; sharp sloping point.	Sm.	"	light purple.	
225 G	"	"	triangular with sharp point at one end.	"	Quartz,		
225 H	"	"	rectangular, notched on one side; the opposite sloping and sharp.	"	Chert,	mtd. greyish pinky.	
225 I	"	"	elongated irregular; sharp sides & point,	"	Quartz,		
225 J	"	"	elongated quadrant with blunt arc.	"	"		
225 K	"	Rubber (?)	pyramidal; smooth & polished on all sides except the under which is irregular and rough. Neolith-like (?)	$1\frac{1}{10}'' \times 1''$	earthy haematite,		

GHADHARA (Symbol G).

226	G	Core,	irregular with flat base; conical top.	Large,	Chert,	brownish white.	
227	"	"	Do. Do.	"	Quartz,		

228	,,	,,	truncated oval; face flaked: cortex on base.	,,	,,	
229	,,	,,	... ...	,,	,,	
230	,,	,,	irregular but well faceted, flat base.	Med.	Chalcedony,	light brown
231	,,	,,	slightly curved amygdaloid; flaked base and face; cortex on butt-end.	,,	Quartz,	
232	,,	,,	pointed oval; convergent flake scars on face; cortex on underside and butt-end.	,,	Chert,	pink.
233	,,	,,	irregular but well faceted; flat cortex on one face.	,,	,,	pinkish
233 A	,,	,,	irregular, flal-based, pointed and flaked on face.	,,	,,	pink.
234	,,	Blade,	irrigularly rhomboidal, slightly tilted and twisted; sharp, irregular sides.	,,	,,	light pink.
235	,,	,,	rhomboidal; ridged: sharp sloping sides.	,,	Chalcedony,	pinkish white.
236	,,	,,	rectangular; Do.	,,	Quartz,	
237	,,	,,	roughly oblong; crudely flaked on face; no clear edge.	,,	Chert,	mtd. brownish & pinkish.
238	,,	,,	amygdaloid; ridged, irregular, sharp sides.	,,	Quartz,	
239	,,	,,	ovoid with prolonged truncated point; ridged; sharp-edged.	,,	Chert,	purplish.
240	,,	,,	rhomboidal with one side-edge curved; ridged: sharp edged.	,,	,,	mtd. greyish & pink.
241	,,	,,	rhomboidal, Do.	,,	Chalcedony,	pinkish.
242	,,	,,	convex polygonal (5 sides) Do.	,,	Chert,	light white pink.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
243	G	Blade,	trapezoid; flattish; partly ridged; sharp edges.	Med.	Chert,	mtd. orange.	
244	,,	,,	trapezoid; ridged; sharp edges.	Sm.	Chalcedony,	white.	
245	,,	,, (?)	quarter of oval; thick body, curved, sharp edge on one side.	Large,	Chert,	pink.	
246	,,	,,	crescentic; worked-back; steeply sloping edge on chord.	Med.	,,	white with pink veins.	
247	,,	,,	elongated-trapezoid; very sharp, slightly curved edge and point.	,,	,,	mtd. ivory & pinkish.	
248	,,	,,	segment of circle; sharp straight edge	,,	,,	variegated whitish & purplish.	
249	,,	,,	crescentic, one end sharply pointed.	Sm.	,,	graded shades of pink.	
250	,,	,,	crescentic; sharp, sloping edge.	,,	,,	mtd. yellow & pink.	
251	,,	,,	Do.	,,	Chalcedony,	translucent, colourless.	
252	,,	Scraper,	convex polygonal (5 sides), sharp concave, one end projecting.	Med.	Chert,	mtd. ivory & pinkish.	
253	,,	,,	truncated semi-circular, face flaked; sharp, steeply sloping edge on the truncated part; bulb on underside.	Large,	,,	mtd. white, greyish & pinkish shades.	
254	,,	,,	triangular, with no edges.	Med.	Quartzite,	pinkish.	
255	,,	,,	convex polygonal (5 sides), on clear edge.	Large,	Chert,	pinkish.	
256	,,	,,	triangular with one side curved; flat; bulb on underside; sharp edges on two sides.	,,	,,	white with pinkish specks.	

257	,,	,,	quadrant, ridged; sharp edges on two sides.	Med.	,,	brown.
45 258	,,	,,	convex polygonal (5 sides); ridged; sharp edges on 4 sides.	,,	,,	pink.
259	,,	,,	a very irregular segment of circle with concavities on one side and the chord; face, well flaked.	Large,	,,	mtd. black & speckled grey.
260	,,	,,	quadrant; sharp edges on 3 sides.	Med.	,,	graded shades of pink.
261	,,	,,	trapezoid; uniformly thin; sharp edge on one side.	Sm.	,,	pinkish.
262	,,	,,	roughly pointed ovoid; with no edges.	Med.	,,	mtd. purplish & pinkish.
263	,,	,,	convex polygonal, well flaked, with curved edge.	,,	,,	brownish with beautiful pinky veins.
264	,,	,,	square with a slightly projected tang; uniformly thick body; neatly flaked all over and under; the end or the side opposite the tanged end has a roughly bevelled edge. Fine specimen of an End-Scraper (?)	,,	,,	pink.
264A	,,	,,	Roundish; thick rounded base with cortex; rest flaked; opposite end has a straight bevelled edge, not sharp.	Large,	,,	veined greyish white.
264B	,,	,,	trapezoid, parallel flake scars on face; bevelled edge.	Med.	,,	whitish with pink specks.
264C	,,	Point,	amygdaloid; one end pointed and sharp; other sharp and sloping.	,,	,,	pinkish .
264D	,,	Scraper (Blade ?),	sector of sphere; slender, edge tectiform and blunt.			

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
265	G	Point,	isosceles triangular; slender; point broken.	Med.	Chert,	brownish with red patches.	
266	,,	,,	trapezoid; neatly worked edge and point.	,,	,,	veiny whitish.	
267	,,	,,	rhombic; thin and flat; one side and point sharp.	Sm.	,,	,, ,,	
268	,,	,,	isosceles triangular; longest point tilted.	,,	Chalcedony,	whitish.	
269	,,	,,	triangular; neatly trimmed and regular side-edges.	,,	Chert,	pinkish.	
270	,,	,,	trapezoid; blunt point.	,,	,,	pink.	

PEDHAMLI, ON PLATEAU OPPOSITE KAROLI. (Symbol 'P')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
271	P	Core,	like a frustum of cone in outline; flattish; one side roughly flaked.	Med.	Chert,	flesh.	
272	,,	,,	water-nut-like; face well trimmed fan-wise to form a bevelled edge; two neat parallel flake scars.	Large,	Chalcedony,	bluish white.	
273	,,	Scraper,	heart-shaped, both sides badly flaked; part of the face trimmed in to a pointed bevelled edge.	,,	Chert,	greyish.	
274	,,	,, ?,	roundish, one side plain; uniformly thick all round, with trimmed border.	,,	Quartz.		
275	,,	,,	irregularly quadrilateral; flat cortex on one side; no edges.	Med.	,,		
276	,,	Blade,	elongated pointed ovoid (just like a carrot in section); partly ridged; back evenly flaked; edges rather blunt.	Large,	Chert,	mtd. light pink & brownish.	

277	„	„	trapezoid; face has a parallel flake scar; worked-back much worn out having some black substance adhering to it;	Med.	? of some porous structure.	brownish.
278	„	„	rectangular; ridged; edge is sharp and concaved or notched at two places; (probably for some special purpose; in this connection No. 103 is also interesting).	„	Chert,	pink with white spots.
279	„	„	crescentic; ridged; sharp and uneven edge.	Sm.	„	„
280	„	„	rectangular; side edges having slopes of greater angles.	„	„	specky milky white.
281	„	„	trapezoid with two sides incurved; parallel flaking on face; blunt edge.	„	„	lightly pinkish.
282	„	„	irregularly quadrilateral; face well trimmed; back has a bulb; edge sinuous and sharp.	Med.	„	greyish pink.
283	„	Point (?),	like a shortened, "eagle" beak; roughly flaked all over; having a short and blunt point and no edges.	„	„	flesh.
284	„	Scraper,	semi-ovoid; flattish; somewhat rounded and well trimmed, (bulb on undersurface) curved edge.	Large.	„	„
285	„	„	semi-circular; trimmed, slightly conical face; sharp, irregular edge.	Med.	Sard,	light brown.
286	„	Blade or Scraper ?	quadrantal; ridged; blunt edge concaved at four places; very rough appearance due to coarse material.	„	very coarse ferruginous quartzite,	dark red.
287	„	Point	triangular; rounded sides, broken point.	„	Chalcedony,	pinkish white.
288	„	Scraper,	quarter of an oval; one side rounded on face and base flat; curved edge showing marks of wear (?)	Large.	Sard.	mtd. shades of brown.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
289	P.	Scraper,	roughly quadrantal; flaked all over: edge blunt.	Large,	Quartzite,	purplish.	
290	„	„	semi-circular; roughly chipped; no edges.	„	„	„	
291	„	„	semi-circular with one corner rounded and the other truncated; flat cortex on one side, round and flat edge (made probably for rubbing purposes).	Med.	„	„	
292	„	Point (?),	parrot beak-shaped; uniformly thick body; roughly chipped all over; incurved side but not sharp edged.	„	„	„	
293	„	Scraper,	quadrantal; flattish; roughly flaked all over; one straight sharp side edge.	V. Large,	Chert,	fleshy with darker inclusions.	
294	„	Point,	conical in outline; cortex on the curved base, sharp projecting point.	„	Quartzite,	purplish.	
295	„	„	triangular with one side slightly incurved; two sharp points.	„	Chert,	greyish pink.	
296	„	„	rhombic with one corner rounded; thick sides; point not sharp.	Med.	Quartzite,	purplish.	
297	„	„	triangular, base rounded; face flaked; sharp point.	Sm.	Chert,	specky greyish white.	
298	„	Scraper (?)	semi-circular with one corner truncated a little; fanwise flaking on face; bevelled edge.	„	„	„	
299	„	„	triangular; slightly conical, flaked face; bevelled blunt edge.	„	„	„	
300	„	„	triangular; flaked on both faces, sharp point.	„	Quartz,		

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301	„	Blade,	pointed oval, mid-ridge; flaked upper and under sides; thick at the butt end; wavy, dull edge.	$2\frac{3}{4}'' \times 1\frac{1}{2}''$ Vein	„		
			PEDHAMLI-KAROLI (SYMBOL PK)				
302	PK		elongated oval, ridged; natural fracture (?)		„		
303	„		semi-circular with one end pointed; perhaps naturally fractured.	„	„		
304	„	„	like a sector of sphere; flat underside; curved side; flake scars ending in an irregular and worn edge.	Large,	„		
305	„	„	shape as of No. 304; but not so high; edge curved and sinuous.	„	„		
306	„		$2\frac{1}{4}$ inches long hexagonal piece of pure quartz (crystal) picked up as a rock sample.	„	Rock crystal,		
307	„	Scraper,	circular; a thin segment of pebble having marks of calcium carbonate encrustation; back flaked having a bulb of percussion; circular, sharp and sinuous edge.	„	Jasper,	chocolate.	
308	„	Point,	pointed trapezoid; ridged; face and back originally flaked; the former has silty encrustation; broken point.	„	Quartz,		
309	„	Scraper,	semi-circular with one point truncated and other rounded; silty encrustation on face.	„	„		
310	„	Point,	triangular; flaked on face; edge on one side; blunt point.	Med.	„		

PEDHAMLI, A SITE BETWEEN PHUḌERA AND RAMPUR (SYMBOL 'PR')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
311	PR	Scraper,	scraper; thick at the butt and thin and fanlike on the opposite end; one-half of the under surface flat; the rest so flaked away as to form an edge, with the sloping, well faceted upper surface, wavy, protruding edge, "step" technique evident.	V. Large,	Quartzite,	grey.	From its size and material it cannot be called a microlith. It resembles a palaeolithic implement.
312	,,	Core,	thick roundish piece; flaked all over, no edge.	Large,	Chert,	mtd. purplish and dirty grey.	
313	,,	Blade, and End-Scraper,	ovoid with pro-longed truncated point, slightly tilted and twisted body; ridged; well trimmed, edges on sides, and on the bevelled end; primary flaked undersurface.	V. Large,	Quartzite,	dark grey. undersurface partly black as if smoked.	Perhaps not a microlith, good specimen of a Levallois type flake.
314	,,	Blade,	obliquely truncated ovoid: thick back; sharp sloping edge.	Med.	Chert,	grey with white inclusions.	
315	,,	Scraper,	rectangular, with rounded ends, well trimmed face; bevelled scraping edge.	,,	,,	grey with pink veins.	
316	,,	Blade,	long, thin, ridged, sharp uneven edges,	V. Sm.	,,	light grey.	
317	,,	,,	rhombic with rounded corner; sharp edge.	Sm.	,,	pinkish.	
318	,,	Point,	crescentic; worked-back blade; blunt point and edge.	,,	,,	brownish.	

319	,,	Blade,	crescentic; broken ends; sharp incurved edge,	,,	,,	,,
320	,,	Point,	isosceles triangular; silty encrustation on coarse cortexed back; very thin and sharp point.	Med.	Quartz.	
321	,,	,,	triangular, flattish: bevelled, sharp, broad point.	,,	Chert,	specky pinkish
322	,,	,,	sub-triangular, flattish; thick, flat butt; sharp, sloping point; notched on either side near the butt, perhaps for hafting.	,,		
323	,,	,,	pointed oval (beak-shaped), thin, low ridge; sharp side edges; blunt point.	Sm.	,,	cloudy brownish
324	,,	,,	sub-triangular; face well trimmed; front half ridged, ending in a dull point; back half slightly sloped as if for hafting.	,,	,,	pinkish brown
325	,,	,,	irregularly quadrilateral; prismatic; broader, but otherwise like No. 324.	,,	Quartz.	
326	,,	,,	triangular; prismatic; sharp edge and point.	,,	Chalcedony,	whitish
327	,,	,,	half segment of circle; ridged: sharp point and side.	,,	Sard,	brownish.
328	,,	,,	quadrantal; trimmed side edge and point.	,,	Chalcedony,	pinkish.
329	,,	,,	cordiform; very thin body; sharp point and side edge.	,,	Carnelian,	,,
330	,,	Flake,	sub-triangular (fan-shaped or cobbler's scraper-like Marathi *Rapi*) thin, broad body: underside flaked; one end broad, gently sloping and dull-edged; opposite acutely angular; one of its side thick and flat and other steeply flaked into a dull edge.	V. Large, $2\frac{1}{4}''$ long	Vein quartz,	

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
331	PR	Scraper,	quadrantal; cortex on butt-end; arc forms blunted edge.	Large,	Quartzite,	grey.	
332	,,	Point,	sub-triangular; cortex on butt-end edge on two sides.	,,	,,	light grey.	
333	,,	Scraper,	truncated cone in outline, dull edge on two sides.	,,	Quartz,		
334	,,	,,	triangular; piece perhaps a natural fracture.	,,	Hemaetite,	light red.	
335	,,	,,	segment of sphere, broken on a side to make edge, marked by concavities and secondary chipping.	,,	Chert,	greyish with pink spots.	
336	,,	,,	pointed oval (like a cowrie in section) face well worked and shaped.	Med.	,,	mtd. pink and milky white.	
337	,,	,,	ovoid; face has a parallel flake scar, trimmed border, no edge.	,,	Chalcedony,	greyish white.	
338	,,	,,	rectangular, perhaps partly broken; face has parallel flake scars.	,,	Chert,	purple.	
339	,,	Rock,	a piece of amazonite felspar; natural piece.	Sm.	felspar,	light green.	
340	PR/2	Scraper,	triangular; broad base, flat, pointed; face mostly lightly flaked into 2 equal halves, by a ridge; the back or butt portion retains cortex; underside primary flake surface; edges dull and irregular.	V. Large,	Quartzite,	grey.	
341	,,	,,	roughly circular; thick body flaked on both sides; trimmed edge on one side.	Med.	Sard,	brownish.	
342	,,	,,	trapezoid, face flaked on one side only to have an irregular edge.	Large,	Quarz,		

343	,,	,,	semi-circular chip flaked off from a pebble; sharp edge with cortex on upper face.	V. Large,	Quartzite,	
344	,,	,,	truncated disc, sharp sloping edge on one side.	Med.	Chert,	mtd. pink and grey.
345	,,	,,	roughly square; parallel flaking on face; sinuous edges.	Sm.	Moonstone,	
346	,,	,,	obliquely truncated ovoid; slightly conical, rest sloping; flaked face.	Med.	Chert,	milky white.
347	,,	Point,	triangular; front face ridged; rest flat; sides gently sloping; underside flaked on one side; dull point and side edges.	Sm.	Sard,	brownish.
			MULSAN RĀM PIR-*NO* ṬIMBO (SYMBOL MR)			
348	MR	,,	semi-ovoid with pointed end; face has a rigde across; screw-driver-like point.	Med.	Chert,	brownish.
349	,,	Scraper,	pointed-ovoid; roughly worked; parallel flaking on one side; no clear edge.	,,	Quartz,	dull white.
350	,,	,,	trapezoid; roughly flaked.	,,	Chert,	dark grey.
351	MV	Point,	amygdaloid; thick butt; ridged; sharp broad point.	,,	Quartz,	
352	,,	Scraper,	segment of circle; ridged; sharp slightly curved edge.	,,	Chert,	dark red.
353	,,	Blade,	elongated ovoid with obliquely truncated point; ridged; one edge irregular and other even.	,,	Quartz,	
354	MR	,,	roughly fish-shaped; flattish; prismatic in section; sharp edges.	Sm.	,,	
355	,,	,,	trapezoid; rough flaking.	,,	,	

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
356	MR	Blade,	quarter of an oval; parallel flake scar on face; sharp edges.	Sm.	Chert,	ivory with orange stains.	
357	,,	,,	segment of circle; flattish; arc forms edge.	,,	,,	brownish.	
358	,,	,,	semi-ovoid: thin, and flat; sharp side edges.	V. Sm.	Chalcedony,	dull white.	
359	,,	,,	triangular.	Sm.	Quartz,		
360	,,	Point,	convex-polygonal with one side rounded; sharp point.	,,	,,		
361	,,	Blade (?)	triangular.	V. Sm.	,,		
362	,,	Point,	semi-amygdaloid; sharp point	,,	,,		
363	,,	,,	amygdaloid.	,,	Chalcedony,	white.	
364	,,	,,	triangular.	,,	Quartz,		
365	,,	Blade,	roughly trapezoid; slender.	,,	,,		
366	,,	,,	trapezoid.	,,	,,		
367	,,	,,	segment of circle; well formed edge.	Sm.	Chalcedony,	brownish white	
368	,,	,,	As No. 367 (a little smaller than No. 367)	...	Quartz,		
369	,,	,,	pointed oval-elongated; worked angular and tilted back; broad platform on face; conchoid of purcussion on back, very sharp steeply sloping side edge and point.	...	Greenstone,		
370	,,	,,	quarter of an oval; very well formed, smooth and sharp edge.	Med.	Carnelian,		
371	,,	Point,	roughly amygdaloid; blunt point.	,,	Quartz,		

372	,,	Blade,	semi-circular; worked-back; cord forms edge.	Sm.	Agate,	milky white.
373	,,	Scraper,	Semi-circular with a truncated point; arc forms edge.	,,	Quartz,	
374	,,	Blade,	trapezoid; sharp and straight edge.	,,	Chert,	pinkish.
3,5	,,	,,	trapezoid; sharp sinuous edge.	,,	Quartz,	
376	,,	,,	trapezoid; narrow edge.	,,	,,	
377	,,	,,	irregularly trapezoid; irregular edge.	,,	,,	
378 ?						
379	,,	Point,	amygdaloid; thin and flattish; blunt point, sharp side edges.	Med.	Quartz,	
380	,,	Scraper,	semi-ovoid, flattish; face has broad parallel flakes scars; perhaps partly broken.	,,	Sard,	brownish.
381	,,	,,	semi-ovoid; broken, flattish.	,,	Chert,	dark grey.
382	,,	,,	sector of circle; flattish; sharp edge.	Sm.	Quartz,	
383	,,	,,	trapezoid, sharp point.	,,	Chert,	greyish.
384	,,	Point,	(diamond-shaped)	,,	,,	
385	,,	,,	isosceles trapezium-like.	,,	Quartz,	
386	,,	,,	isosceles triangle-like with rough sides; broken point.	,,	Chert,	brownish.
387	,,	Blade,	trapezoid; well flaked.	V. Sm.	Sard,	brownish.

AKHAJ, MOUND TO THE SOUTH-WEST OF THE VILLAGE (SYMBOL $\frac{\text{'A'}}{1}$)

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
388	$\frac{A}{1}$	Core,	amorphous with all sides angular due to flaking around.	Large,	Chert,	grey with darker specks.	
389	,,	,,	roughly trapezoid; pebble surface on one side.	,,	Quartzite,	purplish.	
390	,,	Scraper,	irregular (somewhat kite-shaped), part of a pebble.	Med.	Chert,	reddish.	
391	,,		very amorphous; not an artifact.	,,	Quartz,		
392	,,	Scraper ?	roughly semi-circular; sharp edge.	,,	Quartzite,	brownish grey.	
393	,,	,,	roughly semi-circular, (waternut-like); slightly conical; face and back flaked.	Med.	Chert,	brown greyish.	
394	,,	,,	pointed-ovoid; flat and thick.	,,	Quartz,		
395	,,	,,	amygdaloid with point truncated; plano-convex in section face, well faceted; smooth all round.	Sm.	Carnelian,	fleshy.	
396	,,	Blade,	segment of circle; very thin and slightly tilted; irregular sharp edge.	,,	Cacholong,	milky white.	
397	,,	Point,	triangular; one side thick, other sharp and sloping; blunt point.	,,	,,	,,	
398	,,	Blade,	curved oblong; flattish; sharp edges.	,,	Chert,	greyish.	
399	,,	,,	isosceles trapezium-like with a rounded corner; flattish; slight ridge on face; sharp edge.	,,	Cacholong,	milky white.	
400	,,	Part of a blade ?	quadrantal; flattish; parallel flake scar on face and conchoid of percussion on back.	Med.	Chert,	mtd. white & brown.	

401	„	„	G–shaped; flaked around the border of the arc leaving a patch of cortex in the centre and on the chord side; sharp edges.	„	„	pinkish.
402	„	Scraper,	elongated quarter of oval; truncated point; thick worked-back, sharp sloping sides; bulb.	„	Cacholong,	milky white.
403	„	Point,	parrot–beak–like; with one side prolonged; nearly prismatic in section; sharp concave edge and point.	Large,	Chert,	very light grey.
404	„	Scraper,	convex polygonal (5 sides); thick, worked angular back; sharp, steeply sloping side; well faceted.	Med.	„	dark grey with cloudy stains.
405	„	Point,	Right-angular, thick, worked sides; sloping hypotenuse, with sharp edge and point.	„	„	flesh.
406	„	„	semi-circular; slightly twisted flattish body.	V. Sm.	Chalcedony,	milky white.
407	„	Blade,	rectangular with a notched worked–back; sharp edge.	V. Sm.	Carnelian,	rosy.
408	„	Scraper,	rectangular with incurved sharp side.	Med.	Quartzite,	black.
409	„	„	crescentic; thick, cortexed back; sharp sloping edge.	„	Quartz,	
410	„	Point,	a triangular piece broken at the back; sharp point.	„	Rusted copper or bronze,	dark green.
411	„		a small and pointed lump of lead (of recent age).	„	Lead,	
412	„	Scraper,	semi–circular with tectiform cord, thin and flattish; edge curved and sharp.	„	Chert,	purplish grey.
413	„	„	nearly circular; flattish; flaked all over; sharp edge.	„	Quartz,	

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
414	$\frac{A}{1}$	Scraper,	semi-ovoid with a corner truncated; flattish; sharp edge.	Med.	Chert,	dark greyish red.	
415	,,	,,	quadrantal with one side sigmoid; wavy (serrated ?) edge.	,,	,,	rosy.	
416	,,	,,	now rectangular with point and a side truncated, central ridge; sharp edge on one side.	,,	Quartzite,	light purple.	
417	,,	Core, (scraper)	ovoid; thick, sloping body; flat underside; roughly flaked on one side of face.	,,	Chert,	brownish.	
418	,,	Blade,	oblong; flat; edge on one side.	Sm.	Quartzite,	purplish red.	
419 ?							
420	,,	Scraper,	semi-circular; blunted arc; well formed edge.	,,	Quartz,		
421	,,	Point,	semi-circular; Y-shaped ridge on face; one end pointed.	Med.	Granite,	light grey.	
422	,,	Point,	rhombic with point truncated.	Med.	Quartz,		
423	,,	,,	obliquely truncated semi-ovoid; flattish.	Sm.	Chert,	brownish grey.	
424	,,	,,	amygdaloid with slender and sharp point; well worked.	,,	,,	white with brownish tints.	
425	,,	,,	elongated pointed oval; sharp point.	,,	Quartz,		
426	,,	,,	wedge-shaped; with elongated point broken at the tip.	Med.	Quartzite,	lightly purplish.	
427	,,	,,	ovoid pointed at one end and a truncated side; sharp point.	,,	Chert,	mtd. greyish and white.	

AKHAJ, LOESS HILL NORTH OF THE VILLAGE (SYMBOL '$\frac{A}{2}$')

428	$\frac{A}{2}$	Scraper,	convex polygonal (5 sides); roughly worked.	Med.	Chert,	mtd. dark grey & brownish.
429	,,	,,	ovate; prismatic in section; no sharp edge.	,,	Quartz,	
430	,,	,,	trapezoid; ridged face; irregular sharp sides.	,,	Chert,	brownish.
431	,,	Point,	crescentic; ridged; sharp point.	Sm.	Quartz,	
432	,,	Blade,	nearly semi-circular; sharp edge.	V. Sm.	Chalcedony,	milky white.
433	,,	,,	elongated quadrant-like; flattish.	Sm.	Quartz,	
434	,,	Scraper,	point now broken; quadrantal; sharp edges.	Med.	Chert,	brownish.
435	,,	,,	crescentic; worked-back; sharp edge and point.	,,	Quartz,	
436	,,	,,	triangular; front face and back flaked.	Sm.	,,	
437	,,	,,	,, ; sharp point.	,,	,,	
438	,,	,,	,, ; ,,	,,	,,	

AKHAJ, LOESS HILL TO THE SOUTH-EAST OF THE VILLAGE (SYMBOL '$\frac{A}{3}$')

439	$\frac{A}{3}$	Scraper,	triangular; roughly flaked over face having a projecting point.	V. Large,	Quartzite,	light purple.
440	,,	Point,	crescentic; face well flaked; perhaps sharp point broken.	Large,	Quartz,	greyish white.
441	,,	Blade,	semi-circular; both sides worked; irregular edge.	Med.	Chert,	flesh.
442	,,	,,	semi-circular; straight side edge.	Sm.	Quartz,	
443	,,	Point,	crescentic; sharp edge on one side; point broken.	,,	Chalcedony,	greyish white.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
444	A/3	Scraper,	semi-circular; sharp edge on one side.	Sm.	Quartz,		
445	,,	,,	segment of circle with a truncated side.	,,	Chert,	variegated whitish and brownish.	
446	,,	,,	quadrantal; thick; face flaked; edge on one side.	Med.	Quartz,		
447	,,	,,	quadrantal; plano-convex in cross section; face flaked; sharp edge on part of arc and one side; bulb of percussion on side.	Large,	,,		
448	,,	,,	surface rough due to nature of rock; point blunt; steep sloping edge on one side.	Large.	Quartzite,	purplish.	
449	,,	Point,	triangular; good sloping edge on one side, point not sharp.	,,	,,	,,	
450	,,	Scraper,	semi-ovoid with tectiform cord, flattish; sharp edges.	Sm.	Quartz,		
451	,,	Point (?)	nearly ovoid; sharp elongated point.	Med.	Bone,	brownish.	
452	,,	Scraper,	semi-circular; thick back; sharp sloping side.	,,	Quartz,		

LANGHANAJ, MOUND I, SURFACE FINDS (SYMBOL 'L'/1)

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
453	L/1	Core (?)	trapezoid with a semi-oval base.	Med.	coarse quartzite,	greyish.	
454	,,	Blade (?)	pointed ovoid; face has a part of cortex; flat; sharp curved edge.	Large,	Quartz,		
455	,,	Core-like,	trapezoid; tilted; face and side roughly flaked, leaving part of cortex, no edge.	V. Large,	Chert,	greyish.	
456	,,	,,	trapezoid; curved, irregular, rude, parallel flake scars on face.	Large,	Chert,	chocolate.	

457	,,	Blade,	trapezoid and tilted.	Med.	Quartz,	
458	,,	,,	rectangular; flattish; cortex on one side; other sloping and sharp edged.	,,	Jasper,	dark red.
459	,,	,,	obliquely truncated semi-ovoid; prismatic cross section; sharp side edges.	,,	Chert,	brownish grey.
460	,,	,,	convex polygonal; very sharp edge, rather sinuous.	Sm.	,,	brownish.
461	,,	,,	triangular; flattish and slightly curved; sharp edge; perhaps only a chip?	,,	,,	greyish.
462	(?)					
463	,,	Point,	semi-circular with a pointed end; face well flaked.	Med.	,,	mtd. brownish & light grey.
464	,,	Scraper,	segment of circle with rounded edges.	,,	Quartz,	
465	,,	,,	segment of circle; concave edge.	,,	coarse quartzite,	dark grey.
466	,,	Blade,	segment of circle; one end flaked into a very sharp point; chord-edge also sharp.	,,	Jasper,	chocolate.
467	,,	Point,	triangular, sharp point.	V. Sm.	Chert,	pinkish.
468	,,	,,	irregularly rhombic; well faceted; sharp point.	,,	,,	brownish.

LANGHANAJ, MOUND II, (SYMBOL $\frac{\text{'L'}}{2}$)

469	$\frac{L}{2}$		A fossilized fragment of bone.			
470	,,		A fragment of charred fossilized bone.			
471	,,		semi-elliptical piece of a pebble.	V. Large,	Quartzite,	brownish.
472	,,	Rubber or Pestle (?)	semi-elliptical; the edge curved and grounded on both sides.	,,	Sandstone,	purplish.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
473	L_2		A natural nodule of chert.		Chert,	greyish brown.	
474	,,		Triangular; very coarse surface, no edge.	Med.	Silicious, sandstone,	chocolate with yellow film of silt.	
475	,,		triangular; uniformly thick with flat smooth sides and polished edges as in a neolith.	,,	Reddle[1] ,		cf. No. 225 K above
476	,,		a semi-elliptical piece of a small pebble, underside smooth and polished.		Metamorphosed limestone, with silty film patches,	brown.	
477	,,		roughly a segment of sphere; high ridged face; steeply sloping, roughly carved sides; no edges.	V. Large, $2\frac{1}{2}''$ long,	Quartzite,	purplish	
478	,,		ovate-like piece of a pebble; split back, and slightly flaked at one end.	Large,	Jasper,	brown.	
479	,,	Scraper,	circular; flaked segment of a nodule; face partly, roughly flaked; rest has cortex; underside flaked having bulb of percussion.	Med.	Chert,	brownish.	
480	,,		amygdaloid piece of reddle; three-fourth of the face coarse; one-fourth smooth; underside flat but has a deep hole in it.	Large,	Earthy Haematite,		
481	,,	Core;	amorphous with a flat base; roughly flaked all round; no edge.	,,	Silicious sandstone,	brown.	

1 FOOTE had found two cores – one from the bank of the river opposite Kapadvanj, the other from a hill north of Vasai, Vijapur Mahal – which had "sand blast polish." *Notes*, pp. 144–45.

482	,,	Scraper,	irregular trapezium, face and side flaked; cortex on underside.	,,	Chert,	light brown.
483	,,	Core,	resembling an elongated semi-oval in outline with a flat base; straight parallel flake scars on one side: other side originally perhaps well flaked, but later broken as shown by the flaking off of a large chip.	Med.	Jasper,	dark red.
484	,,	Scraper,	Heart-shaped; ridged; one side rather steeply flaked; underside flat; not clear edge.	Large,	Quartz,	
485	,,	Core,	dome-shaped having a rather flat base; skilfully trimmed on one side; underside has cortex.	Med.	,,	
486	,,	,,	convex polygonal; roughly shaped and flaked.	,,	,,	
487	,,	,,	roughly lozenge-shaped; well trimmed all over.	,,	Chert,	dark brown.
488	,,	,,	irregularly triangular having an uneven base; flaked all over.	,,	,,	flesh.
489	,,	,,	quadrantal; face bears small and large clear flake scars.	,,	Agate,	dark brown with alternating red bands.
490	,,	,,	conical, flat base.	,,	Quartzite,	grey.
491	,,	Scraper,	quadrantal; lenticular cross section; face partly flaked.	,,	Chert,	brown.
492	,,	,,	elliptical; conchoid of percussion on under surface; sharp edges.	Large,	Quartz encrustated with silt,	
493	,,		trapezoid; ridged, sharp sloping side and front.	Med.	Chert,	light brown.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
494	L_2	Point,	triangle; hypotenuse has a sharp edge in two curves.	Med.	Quartzite,	purplish.	
495	,,	Blade,	quarter of an elongated oval; ridged; thick and blunt head; rest has a sharp edge.	,,	Chert,	brownish.	Is the head meant for holding the blade?
496	,,	,,	rectangular; steeply ridged sharp edges.	,,	Chalcedony,	dull white.	
497	,,	,,	Y-shaped with broad base; sharp side edges and bevelled edge in front.	Sm.	Chert,	greyish.	
498	,,	,,	triangular, with curved sides; ridged, one side convex, other slightly hollowed; sharp edges.	,,	,,	brown.	
499	,,	,,	segment of circle, thin and flattish; fine sharp edges.	Sm.	Carnelian,	yellowish red.	
500	,,	,,	pointed rectangular; very fine; sharp edges.	V. Sm.	Quartz,		
501	,,	,,	rhomboidal; very fine; sharp edge.	,,	Chert,	light grey.	
502	,,	,,	oblong; very fine; sharp edges.	,,	Chalcedony,	greyish white.	
503	,,	,,	crescentic, curved body; sharp edge at one end.	,,	Chert,	light brown.	
504	,,	,,	trapezoid; prismatic section.	,,	,,	reddish.	
505	,,	,,	elongated ovate with one side incurved; ridged; sharp edges.	,,	,,	reddish brown.	
506	,,	,,	ovoid; face roughly worked.	Med.	,,	reddish grey.	
507	,,	,,	semi-ovoid; face very rough having part of cortex.	,,	Chalcedony,	reddish white.	

508	„	„	segment of circle, face has the original smooth cortex; sharp edges.	„	Carnelian,	dark red.
509	„	„	truncated ovoid; flattish; sharp edge.	Sm.	Chert,	chocolate.
510	„	„	semi-ovoid; ridged; sharp edges on side.	„	indurated haematite.	
511	„	„	part of an obliquely truncated semi-oval; lowly ridged; parallel flake scar on face; sharp edges.	„	Chert,	greyish.
512	„	„	ovoid; very flattish; parallel flake scar on face; sharp edges.	V. Sm.	Sard,	light brown.
513	„	„	trapezoid; cortex on part of face; sharp edges.	Sm.	Chert,	yellow reddish.
514	„	„	trapezoid; ridged; sharp serrated-like curved edge on one side; straight on the other.	„	„	mtd. greyish and pink.
515	„	„	triangular; ridged; sharp edges and point; chisel-like edge at the broad end.	Med.	„	greyish.
516	„	„	triangular; ridge across on face, undulating edge at the broad end; screw-driver-like point at the narrow end, very smooth and polished surface.	Med.	Lydian,	partly dark brown on upper side.
517	„	„	oblong; ridged; sharp side edges.	„	Chert,	reddish brown.
518	„	Scraper,	semi-ovoid with oblique chord; prismatic; bevelled edge.	„	„	greyish.
519	„	„	triangular; ridged; irregular edges.	Sm.	„	mtd. grey and purple.
520	„	„	pointed oval; flattish; curved edge with a concavity.	Med.	„	light brown.

50

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
521	L/2	Scraper,	nearly circular; flattish; half of the arc has thick worked border, the other half has a sharp edge.	Med.	Carnelian,	flesh.	
522	,,	,,	amygdaloid; flattish; cortex on half of face; irregular edge.	,,	Chert,	brown.	
523	,,	,,	ovoid; ridged; convex edge.	,,	,,	reddish brown.	
524	,,	Blade or Scraper ?	triangular; thin and flattish; sharp edge on base.	Sm.	,,	dark brown.	
525	,,	Scraper,	amygdaloid; flattish, face coarsely flaked; sharp edge.	,,	,,	pinkish.	
526	,,	,,	as of No. 525, cortex on face.	,,	,,	reddish.	
527	,,	,,	trapezoid; irregular edge.	,,	,,	greyish.	
528	,,	,,	square with a side slightly curved; flattish; parallel flaking on face.	,,	,,	mtd. purple and grey	
529	,,	,,	pointed oval with a side projected; flattish; irregular curved edge.	,,	,,	greyish white.	
530	,,	,,	trapezoid; flattish; low ridge; sinuous edge.	,,	,,	light brown.	
531	,,	,,	quadrantal; plano-convex; face minutely chipped.	,,	,,	purplish.	
532	,,	,,	convex polygonal; plano-convex	,,	Quartz.		
533				,,	Quartzite,	chocolate.	
534	,,	Blade,	crescentic; thick, worked-back; straight sharp edge; side has a convex flake scar; smooth almost polished under surface.	Large,	Jasper,	crimson	

535	„	„	semi-crescentic; thick, partly worked-back; side has a convex flake scar; slightly curved edge.	„	Chert,	grey.
536	„	Point,	triangular; one end curved and pointed, face partly ridged; sharp edge and point.	„	Carnelian,	brownish pink.
537	„	Blade,	pointed oval; prismatic; heavily encrusted with silt etc.	Med.	crustal portion of a chalcedony nodule,	ivory.
538	,	„	crescentic; badly flaked all over; no edge.	„	Chert,	dark red.
539						
540	„	„	sector of sphere; partly worked-back; blunt edge.	„	„	fleshy.
541	„	„	quadrantal; prismatic; sharp edge.	„	„	greyish.
542	„	„	crescentic; thin and flat; sharp edge with two concavities.	„	„	greyish white.
543	„	„	rectangular; no edge, only a well cut notch on one side.	„	„	dark brown.
544	„	„	crescentic; worked-back; sharp irregular edge.	Sm.	„	point with white spots.
545	„	„	crescentic; ridged; sharp and straight edge.	„	„	grey with reddish shades.
546	„	„	crescentic; hollow in back; sharp edge.	Med.	„	brownish with red shades.
547	„	Point,	semi-crescentic with one end pointed; sharp point (Canine tooth-or Nail-like).	„	„	
548	„	Scraper,	triangular; ridged; sharp straight edge.	„	„	light brown.
549	„	„	triangular; ridged; very roughly worked.	„	Iron ore,	chocolate.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
550	L/2	Scraper,	irregularly trapezoid; very rough flaking.	Sm.	Chert,	brown.	
551	,,	Blade,	crescentic, worked-back; concave blunt edge.	Med.	,,	light brown.	
552	,,	,,	crescentic, pointed; worked-back; slender; straight wavy edge.	,,	Chalcedony,	whitish.	
553	,,	,,	semi-amygdaloid; prismatic.	Sm.	Quartz.		
554	,,	,,	crescentic; worked-back; sharp tectiform edge.	,,	,,		
555	,,	,,	crescentic; worked-back; sharp edge.	,,	,,		
556	,,	,,	As of No. 555.				
557	,,	,,	Do.	V. Sm.	Chalcedony,	red.	
558	,,	Scraper,	semi-oval, obliquely truncated; flattish; cortex on face; sharp edge.	Large,	Quartz.		
559	,,	,,	semi-circular; thick, worked-back; straight sharp edge.	Med.	Chert,	purplish.	
560	,,	Blade,	elongated amygdaloid, parallel flake scars on face; sharp, straight edge.	,,	,,	grey.	
561	,,	Point,	sub-triangular; thick rounded base, sharp point.	,,	Quartz.		
562	,,	,,	amygdaloid; cortex all over face; part of a pebble, with end pointed.	,,	,,		
563	,,	,,	triangular; sharp point.	,,	,,		

564	,,	?	leaf-shaped; steep flaking on face marked by two broad platforms; sharp point.	V. Large.	Chert,	white.
51 565	,,	Blade,	broad crescentic flake; hollowed or broken at one end; face has a ridge; bulb of percussion; sharp, convex edges.	Large,	,,	mtd. grey & brownish.
566	,,	Scraper,	semi-circular with a projection in the middle of chord; flattish; roughly flaked, blunt edge; covered all round with calcium carbonate.	,,	,,	dark brown.
567	,,	Point,	triangular, half of face flaked.	,,	Quartzite,	purplish.
568	,,	Scraper,	quadrant of oval; flattish; blunt edges.	Med.	Chert,	light brown with dark grey inclusions.
569	,,	,,	almost circular, with a notch or hollow at one side; face flaked all over leaving a small patch about the centre.	,,	,,	dark brown.
570	,,	?	triangular; flat;	Sm.	Rock crystal.	
571	,,	Scraper,	triangular; flattish; no clear edge.	,,	Quartz.	
572	,,	,,	pointed oval, elongated and truncated; sharp edge.	V. Sm.	Chert,	dark brown.

VERAI MATA-*NO*-TIMBO, BETWEEN RANACHODPURA AND JORNAG TO THE S. W. OF LANGHNAJ. (SYMBOL 'MM').

572	MM	Blade ?	trapezoid; prismatic; roughly flaked,	Med.	Chert,	reddish brown
573	,,	?	segment of circle; high ridge; flat smooth base; face roughly trimmed; no edges.	,,	Jasper,	purplish.
574	,,	Blade	trapezoid; ridge flaked away, sharp edges.	,,	Chert,	,,
575	,,	,,	rectangular, steep, sharp-edged ridge; base slightly hollowed; points on either end broken.	,,	,,	veiny dark grey.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
576	MM	Blade,	crescentic; worked-back; concave base.	Med.	Chert,	flesh.	
577	,,	,,	segment of circle; rather flattish; all sides flat.	Sm.	,,	light brown with greyish tints.	
578	,	,,	ovoid, one end truncated; face well flaked. chisel-like straight edge.	Med.	,,	light	
579	,,	,,	two-edged, long (?) blade, now half broken, face has a flake scar; sharp edges.	Sm.	,,	grey.	
580	,,	,,	crescentic; worked-back; sharp and sinuous edge.	V. Sm.	Chalcedony,	milk white.	
581	,,	,,	now triangular; originally crescentic ?; worked-back; sharp and sigmoid edge.	Sm.	Chert,	greyish pink.	
582	,,	,,	crescentic; sharp edge.	,,	,,	blackish.	
583	,,	Scraper,	triangular; flattish; sharp edge.	,,	,,	brownish.	
584	,,	Blade,	crescentic, S-shaped; twisted; worked-back; sharp edges.	Large,	,,	dark grey with brown stains.	
585	,,	,,	rectangular, ridged, sharp edges.	Sm.	,,	chocolate.	
586	,,	,,	crescentic, worked-back; sharp, sinuous edge.	V. Sm.	,,	flesh.	
587	,,	Scraper,	obliquely truncated semi-elliptical; face minutely chipped; sharp edge.	Med.	,,	purplish.	
588	,,	,,	quadrantal; serrated (?) edge.	,,	Chalcedony,	milky white.	
589	,,	Hollow Scraper (?)	horse-shoe-like; thick, worked-back; hollow, sharp edge.	Sm.	Chert,	chocolate.	
590	,,	,,	crescentic, broad; thick, worked-back; fairly sharp edge.	Med.	,,	dark brown.	

591	„	„ or Blade,	rectangular; chisel-like; thick, well-faceted back; sloping, fairly sharp edge.	„	Iron ore,	chocolate.	
592	„	Point,	sub-triangular; low central ridge; sharp point.	Sm.	Chert,	„	
593	„	„	triangular; sharp point. Originally long, now back broken.	„	„	light brown.	
594	„	„	segment of circle; all sides flat; sharp point.	Med.	„	brownish.	

JUNI SHEDHAL-BĀMANIYO ṬIMBO (SYMBOL $\frac{\text{'J'}}{\text{S}}$)

595	$\frac{J}{S}$	Scraper,	quadrantal; sharp irregular edge.	Med.	Quartz.		
596	„	Blade,	rhomboidal; plano-convex; well trimmed; very sharp edges.	„	Chert.	brown.	
597	„	„	semi-elliptical; sharp edge.	Sm.	Quartz.		
598	„	„	oblong; flattish; sharp curved edge.	V. Sm.	„		
599	„	„	rectangular; low central ridge, sharp edge.	„	Chert.	brown.	
600	„	Scraper,	ovoid, flattish; thick back; sharp edge.	Med.	„	milk white with greyish tints.	
601	„	„	crescentic; sharp irregular edge.	Sm.	Quartz.		
602	„	„	ovate; plano-convex.		„		
603	„	„	quardrantal; flattish.	V. Sm.	„		

DANGARWA - VENU-*NO*-CHARO (SYMBOL $\frac{\text{'D'}}{\text{V}}$)

604	$\frac{D}{V}$	„	semi-circular; prismatic; cortex on arc, blunt and irregular edge.	Large,	Chert,	greyish white.	
605	„	„	ovoid; flattish; worked-back; sharp curved edge.	Sm.	Chalcedony,	reddish white.	
606	„	Point,	leaf-shaped; very delicate; sharp point.	V. Sm.	Quartz.		

WAḌU, KOḌIVĀḶO ṬIMBO (SYBMOL $\frac{\text{'W'}}{\text{K}}$)

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
607	$\frac{W}{K}$	Core,	convex polygonal, very irregular form, all sides sharp.	Med.	Chert,	reddish.	
608	,,	,,	irregularly triangular with several sides and projections; very crude form.	,,	,,	grey.	
609	,,	Blade,	quadrantal; very thin and flat; sharp edge.	Sm.	,,	mtd. brown & pink.	
610	,,	Scraper,	quadrantal; thick worked-back; flattish; blunt edge, (a broken piece ?)	,,	Quartz.		
611	,,	,,	trapezoid with two corners rounded; sharp and sinuous edge.	,,	,,		
612	,,	,,	semi-circular; flattish; blunt and rounded; flat thick chord.	Large,	Quartzite,	greyish brown.	
613	,,	,,	convex polygonal; plano-convex; a step and parallel flake scar on face; straight edge.	Med.	Chert,	mtd. brown & dark pink.	
614	,,	Blade ?	quadrantal; trimmed face.	Med.	Chalcedony,	light brown.	
615	,,	Scraper,	semi-oval; flattish; sharp and sinuous edge.	Sm.	Quartz.		
616	,,	Point,	amygdaloid; flattish; sharp point.	,,	,,		
617	,,	Point and Blade,	crescentic; one end curved, elongated and sharp-pointed.	V. Sm.	,,		
618	,,	Point,	lozenge-shaped; ridged, pointed at both ends.	Sm.	Chert, (porous)	brownish.	
619	,,	,,	quadrantal; prismatic; sharp point.	,,	Quartz.		
620	,,	,,	triangular; sharp and long point.	,,	,,		

621	"	"	convex polygonal; flattish.	"	"	
622	"	"	triangular, rounded base; sharp point; step flake scar on face.	"	"	
KIYAL, MOUND OPPOSITE BAHMANYA MOUND OF SHEVADI (SYMBOL 'K')						
623	K	Core,	broad pointed oval; steep sloping ridge on face, two flake scars on one side.	Large,	Quartz.	
624	"	Scraper,	convex polygonal; flat sides.	"	"	
625	"	Core,	pentagonal; thick flat body.	Med.	"	
626	"	Scraper,	trapezoid; both faces slope gently to form a broad and sharp edge.	"	"	
627	"	Point,	lozenge shaped having a long projection to form a point like that of a drill; sharp edges on two sides.	"	Chert,	greyish brown.
628	"	"	pointed oval; front half of face much flaked, with a small side-ridge and sides meeting in a sharp point, the back half has deep flake scars, underside has a low bulb of percussion.	"	"	reddish brown with darker specks.
629	"	"	triangular; ridged; dull point.	"	"	
630	"	"	quadrantal with angular arc; very flattish; all sides blunt; broad and sharp point, perhaps a chip ?	Med.	"	flesh with brownish shades.
DANGARWA, RABARI-*NA*-GOCHARA-*NO*-ṬIMBO (SYMBOL $\frac{\text{'D'}}{\text{R}}$)						
631	$\frac{D}{R}$	Core,	rounded, flat-based; roughly flaked, part of the cortex.	V. Large,	Chert,	greyish brown.
632	"	Scraper,	amygdaloid; roughly flaked; quite blunt and worn edges.	Med.	"	dark brown.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
633	$\frac{D}{R}$	Scraper,	amygdaloid; original cortex on most of face; underside flaked; sharp side edge.	Large,	Quartz.		
634	,,	,,	rectangular with rounded edge; cortex on face; sharp bevelled edge.	Med.	,,		
635	,,	,,	semi-ovoid, thick back; sharp sloping edge.	,,	,,		
636	,,	,,	Do.				
637	,,	,,	quadrantal; cortex on part of face; curved and sharp edge.	Sm.	,,		
638	,,	,,	ovoid; ridged; convex bevelled edge.	,,	,,		
639	,,	,,	quadrantal; flattish; curved sinuous edge.	,,	,,		
640	,,	,,	as of 639; bevelled edge.	,,	,,		
641	,,	Point,	elongated pointed oval; blunt point.	V. Sm.	,,		
642	,,	Blade,	two-edged, rectangular; ridged; sharp edges.	,,	,,		
643	,,	Bone,	a rectangular fragment.	Sm.			

HADOL, HUGE MOUND (SYMBOL $\frac{\text{'H'}}{\text{D}}$)

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
644	HD	Point,	triangular; curved body; blunt and tilted point.	Large,	Quartz.		
645	,,	Blade,	crescentic; worked-back; coarse; blunt edge.	Med.	,,		
646	,,	,,	elongated ovoid; sharp, tectiform edge.	Sm.	,,		
647	,,	,,	oval; ridged; coarse; no clear edge.	,,	,,		
648	,,	Core,	trapezoid; cubical (perhaps broken).	,,	,,		

RANGPUR (SYMBOL 'RP')

649	RP	Core,	elongated trapezium-like; obliquely flat base; one clear parallel flake scar on face.	Med.	Quartz.		cf. No. 119 above.
650	"	Scraper,	rhombic with two sides rather curved; plano-convex; curved edge.	"	"		
651	"	"	U-shaped; sharp convex edge around; well flaked face.	"	Chert,	greyish white.	
652	"	"	oblong with two corners rounded; cortex on part of face; sharp edge on one side.	"	"	brownish red with white specks.	
653	"	"	rhombic with corners rounded; flattish; face flaked; sharp curved edge.	"	"	brownish white.	
654	"	"	segment of circle; flat chord; no edge.	"	Quartz,		
655	"	"	convex polygonal; steep ridge; edge undulating; irregular body.	"	"	(transparent).	
656	"	Point,	segment of circle; prismatic; sharp point.	Sm.	"		
657	"	Scraper,	quadrantal; sharp edge.	"	"	(less transparent)	
658	"	"	semi-ovoid; bevelled edge.	"	"	(transparent).	
659	"	"	ovoid; plano-convex; well shaped and finished; steep edge.	"	"		

VETALPUR - RANGPUR, MOUND I (SYMBOL 'VR').

660	VR	Core,	rectangular; steeply sloping; flat base; sharp edge.	Med.	Quartz.		
661	"	?	pointed oval; steep, curved ridge; flat base.	Large,	"		
662	"	"	quadrantal; conical outline; flat base.	Med.	"		

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
663	VR	Scraper,	heart-shaped; bevelled edge.	Med.	Quartz		
664	,,	,,	conical with square flat base; face well flaked.	,,	,,		
665	,,	,,	cordiform, flattish, well flaked face.	Sm.	,,		
666	,,	,,	ovoid; plano-convex; sharp circular edge.	,,	,,		
667	,,	Blade,	plano-convex; two-edged; ends perhaps broken; bulb of percussion on under surface.	Med.	,,		
668	,,	,,	ovate; flattish; sharp angular, chisel-like edge.	,,	,,		
669	,,	,,	ovoid; plano-convex; no edge.	,,	,,		
670	,,	,,	ovate; plano-convex; blunt edge.	Sm.	,,		
671	,,	Point,	triangular-like; blunt point.	,,	,,		
672	,,	Blade,	crescentic; slightly sharp angular back.	Med.	,,		
673	,,	,,	semi-circular; blunt convex edge.	,,	,,		
674	,,	,,	semi-circular; blunt edge.	,,	,,		
675	,,	,,	rectangular, ridged, obliquely truncated ends, edge on one side.	,,	,,		
676	,,	,,	truncated sector of circle; worked-back; sharp edge; shapely.	,,	,,		
677	,,	Scraper,	rectangular, one end pointed; blunt edge on one side.	,,	,,		
678	,,	Point,	triangular, mid-ridge, sharp point.	Sm.	,,		

679	„	Blade,	crescentic, two-edged.	„	„		
680	„	„	sub-rectangular; ridged; chisel-like sharp edge.	„	„		
			KANERIA, MOUND WEST OF (SYMBOL 'KN (1)')				
681	KN (1)	Core,	irregularly cylindrical; upper part broken; well trimmed parallel facets.	Sm.	Sard,	dull yellow.	
682	„	Scraper,	semi-circular with a corner truncated; no edge.	„	Quartz.		
683	„	Blade,	rectangular; plano-convex face, sharp side edges.	Med.	„		
684	„	„	amygdaloid, sinuous curved edge.	Sm.	„		
			KANERIA, MOUND II, ONE FURLONG S. W. OF (SYMBOL 'KN (2)')				
685	KN (2)	Core,	cone-shaped with vertex towards a side; cleanly faceted; blunt circular edge; a discoid.	V. Large.	Quartzite (fine grained)	grey.	
686	„	Scraper,	ovate-like with a projecting side; irregular edge.	Large	„	„	
687	„	„	semi-circular; sloping at either end; sharp edges.	Med.	Quartz.		
688	„	„	convex polygonal with one point rounded; prismatic; sinuous edges.	„	„		
689	„	„	rhombic; parallel and step flaking, on face and back; tectiform edge.	„	„		
690	„	Blade,	part of a long (?) double-edged blade, ridge partly flaked away; sharp sigmoid edges.	„	„		
691	„	„	irregularly quadrilateral; parallel flake scar on face; one edge sinuous and other curved, both sharp.	„	„		

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
692	KN (2)	Blade,	elongated pointed oval; face roughly flaked; sigmoid edges.	Med.	Quartz.		
693	,,	Scraper,	obliquely truncated semi-oval; plano-convex; sharp edge.	Sm.	,,		
694	,,	,,	obliquely truncated ovoid; plano-convex face, sinuous edges.	,,	,,		
695	,,	,,	irregularly quadrilateral; prismatic; all sides flat; sigmoid small edge.	,,	Chert,	white with grey stains.	
695A	,,	,,	rectangular, flat and thin; sharp edges.	,,	,,		
696	,,	,, Point (?)	convex polygonal; prismatic; straight edge projecting at one end.	Med.	,,		
			MALIPARA, NORTH OF THE MOUND. (SYMBOL 'MP').				
697	MP	Core,	roundish, flaked on both faces; on the upper two neat parallel flake scars; sharp bevelled edge.	Large,	,,	brownish grey with white veins.	
698	,,	Scraper,	oblong, flat; all sides flat.	Med.	Chalcedony,	flesh.	
699	,,	Core,	irregularly quadrilateral; flaked all over.	,,	Quartz.		
700	,,	,,	flat-bottomed, well faceted, small rectangular piece, perhaps part of a large rectangular, long core.	,,	,,		
701	,,	Scraper,	triangular; prismatic; sharp edge.	Large.	,,		
702	,,	,,	trapezoid; plano-convex; sharp tectiform edge, as in a hollow scraper.	,,	,,		
703	,,	,,	convex polygonal with one side concave; lenticular; sigmoid edge.	Med.	,,		

704	,,	Point and Blade,	ovoid, plano-convex, well flaked face and back; sharp edges and point, slightly thick at the butt.	Large,	,,	
705	,,	Scraper,	quadrantal; flattish; well sloping sharp irregular edges, part of a two-edged blade.	Med.	,,	(transparent)
706	,,	,,	quadrantal-elongated; flattish; arc forms a sharp edge; other sides blunt and flat.	,,	Quartzite,	light grey.
707	,,	,,	pointed semi-oval; flattish; curved edges and point.	,,	Quartz.	
708	,,	,,	quadrantal; sharp edge; looks beautiful due to the transparency of the rock.	Sm.	,,	(pure transparent)
709	,,	,,	pointed oval, small bulb of percussion; sharp irregular edge and point.	Med.	,,	
710	,,	,,	semi-amygdaloid; prismatic; curved, sharp and sinuous edge.	Sm.	,,	
711	,,	Blade and Point,	pointed rectangular; prismatic, slightly tilted; sinuous edge.	Med.	Chalcedony,	ivory.
712	,,	,,	partly crescentic, worked-back; flattish; sharp edge.	Sm.	Quartz.	(transparent)
713	,,	Point ?	truncated cone; prismatic; sharp point.	,,	,,	,,
714	,,	,,	semi-decagonal; flattish; arc forms an angular and sharp edge.	,,	Chert,	fleshy.

SHIYALPURA (SYMBOL 'SP')

715	SP	Hammer stone-(small)	Part of a flat-bottomed, oval pebble (about 2¼″ in length originally); one end and portion of upper face flaked; one large flake scar on undersurface; one end rounded pebble surface; other has a bruised, dull point.	V. Large.	Quartz.	

DHARWANIA, MOUND SOUTH OF (SYMBOL 'DW')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
716	DW	Core,	irregularly convex polygonal;	Large,	Quartz.		
717	"	"	conical, well faceted.	Med.	"		
718	"	"	like an irregular common salt crystal in form.	Sm.	"	light grey.	
719	"	Scraper,	rectangular; small, chisel-like edges.	Large,	"		
720	"	"	triangular, sigmoid edge of base; point broken.	Med.	"		
721	"	"	trapezoid, blunt point.	Sm.	"	light grey.	
722	"	Blade,	pointed ovoid; sharp sinuous edge.	"	"		
723	"	"	trapezoid; flattish; sharp edges; part of two edged-blade.	V. Sm.	"		
724	"	"	semi-oval; flattish; part of a two-edged blade.	"	"		

VASAD, 1 MILE N. E. OF PLOUGHED LOESS SURFACE (SYMBOL 'VD')

725	VD	Scraper (?)	sector of circle (45°); nearly prismatic; well cut and regular side edge; point much worn out.	V. Large,	Quartz.		
726	"	?	part of a flat-bottomed oval pebble; flaked upwards from the fractured side.	"	"		
727	"	?	as No. 726; marks of wear on edge (?).	Large,	"		
728	"	?	a portion of circular pebble with a smooth flaked surface.	"	"		

729	,,	?	triangular; prismatic in part; axe-like edge.	,,	,,	
730		?				
731	,,	?	truncated cone; semi-hexagonal.	Med.	Quartz.	
732	,,		a fractured, small nodule of chert.	Large,	Chert,	greyish nodule.
733	,,		as of No. 632.	,,	,,	chocolate.
734	,,		a pebble fractured on three sides.	,,	,,	flesh.
735	,,		as of no. 334.	,,	,,	black with brown inclusions.
736	,,	Core,	an elongated (somewhat cylindrical) chalcedony nodule flaked in parallel lines on one side; no edge or point.	,,	Chalcedony,	greyish white.
737	,,	,,	as of no. 736; flake scars are quite parallel and very clear.	,,	Chert,	brownish grey.
738	,,	,,	as above.	,,	,,	light grey.
739	,,	,,	oblong in outline and quadrantal in cross section; flaked on four sides; a capsule on one surface; blunt edge.	Med.	Chalcedony,	greyish white.
740	,,	,,	a piece of nodule flaked so as to resemble a truncated segment of circle; two scars of 'step' flaking; truncated side forms a scraping edge.	,,	Agate,	(very minute bands) white.
741	,,	Scraper,	sector of oval; sharp ovoid edge.	Large,	Quartz.	
742	,,	?	quarter of an oval with a corner concaved; chipped on both sides; incurved edge.	,,	Quartzite,	chocolate.
743	,,	,,	semi-elliptical having oblique chord; roughly flaked; blunt edge.	Med.	Quartz.	

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
744	VD	Scraper,	pointed ovoid; lenticular; sloping side edges.	Med.	Quartz.		
745	,,	,,	semi-circular; cortex on one side, arc forms a sharp edge.	,,	,,		
746	,,	Blade,	piece of a cylindrical piece, perhaps used as a blade.	,,	,,		
747	,,	Point,	rhombic; prismatic; cut points.	Sm.	,,		
748	,,	Scraper,	trapezoid; flattish, sharp edge.	Med.	,,		
749	,,	,,	amygdaloid; prismatic; sharp edge and a sharp point; well worked.	,,	Agate,	brownish.	
			JALAMPURA, ½ MILE EAST OF THE VILLAGE ON THE LOESS SURFACE MUCH CUT UP BY KOTARS (SYMBOL 'JP')				
750	JP	?	part of a flat-bottomed pointed oval pebble.	V. Large,	Quartz, nodule,	white.	
751	,,	,,	semi-spheroid; flaked all along the sides to sharpen the edge produced by the flat base; discoid-shaped.	Large,	,,		
752	,,	Core,	sector of sphere; even parallel flaking on sides; cortex on underside.	,,	,,		
753	,,	Scraper,	trapezoid; roughly trimmed all over; very blunt edge and point.	Med.	Agate,	white.	
754	,,	Blade,	long rectangular; two-edged; partly broken, sharp side edges; (bulb on underside.)	Large,	Quartz.		
755	,,	,,	parrot beak-shaped; partly flaked on face; sharp incurved edge.	,,	,,		
756	,,	,,	crescentic; worked-back; sharp edge.	Sm.	Agate,	milk white.	

757	,,	,,	rectangular, two-edged; part of a long (?) blade; undulating edge.	Med.	Quartz.		
758	,,	Scraper,	irregularly quadrilateral; prismatic; one edge blunt and other sharp.	,,	,,		
759	,,	Point,	sub-triangular; flattish; sharp edge and blunt point.	,,	Quartzite,	dark grey.	
760	,,	Scraper,	amygdaloid; prismatic; sharp edge; natural capsule on one side.	,,	Moonstone.		
			BAHADURPUR, NEAR KUNDYA NULLA (SYMBOL 'BP')				
761	BP	Scraper, Core ?	semi-circular; one side plain, other irregularly flaked, blunt undulating edge.	Med.	Agate,	greyish white.	
762	,,	Blades ?	sector of circle; prismatic; sharp edge.	Sm.	Chalcedony,	bluish white.	
763	,,	,,	convex polygonal (5 sides); plano-convex.	,,	Carnelian,	light yellow.	
764	,,	,,	rolled, triangular, ridged, blunt edges, perhaps a natural piece.	,,	Quartz.		
765	,,	Point or Blade ?	parrot beak-shaped; well flaked face sloping at either end; sharp point.	Med.	,,		
766	,,	Blade,	rectangular, slightly curved; prismatic; one (irregular) side edge.	,,	,,		
767	,,	,,	crescentic; plano-convex; sharp edge.	Sm.	,,		
768	,,	,,	crescentic, ridged, sharp incurved edge.	,,	Chalcedony,	white.	
769	,,	,,	trapezoid; prismatic; sinuous edge.	,,	Carnelian,	yellow.	
770	,,	,,	piece of a small two-edged blade, sharp edges.	V. Sm.	Chalcedony,	bluish white.	
771	,,	Scraper,	amygdaloid; plano-convex; zigzag edge.	Sm.	,,	white.	
772	,,	,,	,, prismatic, irregular edges.	V. Sm.	,,	,,	

WADELI, FROM THE SURFACE OF LOW MOUND ON THE LEFT BANK ON THE ORSANG RIVER ABOUT ½ MILE S. W. OF THE VILLAGE (SYMBOL 'WD')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
773	WD	Scraper,	rectangular, one corner rounded and thick; the opposite slopes ending into a sharp edge.	V. Large,	Quartzite, (fine grained).	light purple	
774	"	?	triangular; plano-convex; all sides blunted and made flat; part of a pointed cylindrical piece.	Med.	Quartz.		
775	"	"	rectangular; thick at the butt end gently sloping on the other end; sharp edge.	"	"		
776	"	"	trapezoid; thick cortex on one side; sharp edge.	"	Chalcedony,	bluish white.	
777	"	Scraper,	triangular, with a number of facets on face.	Med.	Chalcedony,	waxy white.	
778	"	Point,	triangular crescentic; worked-back; sharp undulating edge and point.	Sm.	Plasma,	green.	
779	"	Scraper,	(now a) quadrantal; plano-convex; sharp edge (part of a large piece).	"	Quartz.		

BODELI, AT A DISTANCE OF ABOUT 2 MILES S. OF BODELI FROM THE FIELD NEAR THE RUINS OF A MEDIEVAL TEMPLE (SYMBOL 'BD')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
780	BD	Point,	elongated cordiform; plano convex, three parallel flake scars and cortex at butt-end; blunt point.	V. Large,	Quartzite,	brownish pink.	
781	"	Scraper,	amygdaloid; face and back are not flaked; sides flaked so as to make scraping edge by intersection with the plane of the original nodule surface.	Large,	Chert,	brownish grey.	
782	"	Point,	conical; butt rounded, cortex; blunt point.	Med.	Chalcedony.	white.	

783	„	?	segment of circle, elongated; prismatic.	Large,	Vein quartz.	
784	„	Scraper,	semi-circular; flattish; rough flaking; irregular edges.	„	„	
785	„	Blade ?	parrot beak-shaped; flattish; incurved edge.	Med.	„	
786	„	Scraper ?	trapezoid; very roughly worked.	„	„	
787	„	Blade ?	semi-circular; flattish; sharp wavy edge.	„	„	
788	„	„	semi-circular; thin; sharp edge.	„	„	
789	„	„	trapezoid; plano-convex; sharp and wavy edges.	Sm.	Chalcedony,	bluish white.
790	„	„	amygdaloid with one side truncated; flattish; wavy blunt edge.	„	Quartz.	
791	„	Scraper,	semi-circular; sharp sloping edge.	„	„	(pure).
792	„	Blade,	rectangular; low ridge; both ends have sharp points; edge has a small notch.	„	Chert,	dark brown.
DOKARIYA, CHHOTA UDEPUR STATE, ABOUT 1 MILE N. E. OF BODELI (SYMBOL 'DU')						
793	DU	Core,	part of a large cylindrical pebble; many large and small flake scars; the smooth cortex on the butt and in patches elsewhere.	Large,	Chert,	dark chocolate.
794	„	„	quadrantal, a piece of pebble having four flaked sides with the original pebble surface forming its top.	V. Large,	Quartzite (banded beautifully like an agate)	chocolate with light coloured parallel and alternating bands.
795	„	„	semi-circular, facets all over, except on one side which has cortex; narrow edge at one corner.	Large,	Silicious sandstone,	brown.
796	„	„	trapezoid; irregular flaking; straight edge.	„	Jaspery chert,	purplish.

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
797	DU	Core,	circular, flat, flaked base; face well trimmed around except on one side which retains edge.	Sm.	Jaspery chert,	purplish.	
798	,,	Blade, Scraper ?	part of an ovoid blade or scraper; rolled cortex; well trimmed, bevelled edge.	,,	Chert	red.	
799	,,	Core,	amygdaloid; parallel flake scars on both sides; worn edges; well worked.	Med.	Jasper,	dark grey.	
800	,,	,,	semi-oval; parallel flake scars on face; step flaking on one side; irregular edge.	Sm.	Chert,	light grey.	
801	,,	Blade,	isosceles trapezium; prismatic; step flaking on face; bulb of percussion, one side edge straight and other retouched.	Med.	Jasper,	crimson.	
802	,,	Scraper,	semi-oval; face wholly flaked, retaining a tiny flat patch; sharp, convex, bevelled edge.	V. Large,	Quartz.		
803	,,	,,	semi-circular; lenticular; edge curved and quite blunt showing marks of wear.	Large,	,,		
804	,,	,,	trapezoid; prismatic; rough flaking on both faces; flat base.	Med.	Jaspery Chert,	dark brown.	
805	,,	,,	semi-hexagonal; flattish; blunt edges.	,,	Quartz.		
806	,,	,,	amygdaloid, plano-convex; flaked face; worn edges.	,,	,,		
807	,,	,,	amygdaloid; prismatic; conical; well flaked ridge on face; sinuous edge around.	,,	,,		
808	,,	,,	ovate with obliquely truncated upper portion; prismatic; sharp edges.	,,			

809	,,	,,	semi-circular; mid-ridge on face; back has a low conchoid of percussion, roughly straight and blunted along half of its length, curved, irregular and fairly sharp edge on one side.	V. Large,	,,	
810	,,	,,	obliquely truncated ovoid; plano-convex; face unflaked; sharp edge around.	Med.	,,	
811	,,	Blade,	elongated ovoid with one end truncated in tectiform shape; plano-convex; low bulb on face; two-edged; on straight and other curved.	Large,	,,	
812	,,	,,	truncated ovoid-prolonged; prismatic; one well cut straight edge.	Med.	Chert,	red.
813	,,	,,	rectangular; ridged sharp side edges.	,,	Chalcedony,	bluish white.
814	,,	,,	convex polygonal-elongated; prismatic; straight edge.	,,	Quartz.	
815	,,	,,	ovoid, flat, thin, fine, parallel flake scar on face; bulb; sharp edge.	,,	Chert,	reddish.
816	,,	,,	convex polygonal-elongated; ridged, sharp side edges.	Med.	Crustal part cf a chalcedony pebble,	pinkish.
817	,,	,,	segment of circle; ridged; retouched underside; one side edge sigmoid and other undulating.	,,	Jasper,	red.
818	,,	Scraper,	rectangular; partly ridged; step flaking on face.	,,	Chert,	light grey.
819	,,	,, or Blade ?	rectangular; face flaked; one end upturned, and smoothed by use (?); one side edge retouched; other concave.	,,	,,	chocolate.
820	,,	Scraper,	semi-elliptical; flattish; well trimmed edge.	Sm.	,,	,,

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
821	DU	Blade,	rectangular, parallel flake scar on face; two-edged.	Sm.	Chert,	mottled white red and black.	
822	,,	Scraper,	irregularly oval; ridged, sharp edge.	,,	Moonstone.		
823	,,	Blade,	semi-circular; ridged; one edge straight and other convex with a hollow.	Med.	Quartz.		
824	,,	,,	rectangular; ridged; irregular edges.	,,	,,	banded.	
825	,,	,,	elongated ovoid; prismatic; tilted; one edge straight, other tectiform.	,,	,,		
826	,,	,,	rectangular, chisel-like edge.	,,	,,		
827	,,	,,	convex polygonal (5 sided); flattish; well trimmed on face.	,,	Carnelian,	white transparent	
828	,,	,,	crescentic; sharp, curved edge.	Sm.	Quartz,	white.	
829	,,	,,	semi-amygdaloid; ridged; sharp edges.	V. Sm.	Chalcedony,	greyish white.	
830	,,	Scraper or Blade,	sector of sphere; thick, worked, convex back; sharp sigmoid edge.	Med.	Quartz.		
831	,,	,,	crescentic, angular; thick worked-back; sharp, worn (?) edge.	,,	Chert,	chocolate.	
832	,,	Scraper,	half cf a segment of circle; scalene-trapezoid section; very well trimmed, curved irregular edge.	,,	Agate,	(opaque) white.	
833	,,	Scraper,	ovoid; ridged; edge tectiform and sharp.	,,	Quartz.		
834	,,	,,	semi-circular; roughly but clearly faceted; worn edge.	Sm.	Chert,	chocolate.	
835	,,	,,	semi-circular; partly ridged; sharp edge on convex side and on chord, small bulb.	Med.	Jaspery chert,	purplish.	

836	,,	,,	amygdaloid; plano-convex; well trimmed face; retouched side edge.				
56 837	,,	. ,,	convex polygonal; flattish; serrated-like edge, on one side.	,,	Jasper,	dark chocolate.	
838	,,	,,	truncated oval with one side incurved; flattish; roughly flaked wavy edge.	,,	Chalcedony,	translucent white.	
839	,,	Awl,	elongated semi-elliptical with a long and narrow projection; a 'pseudo-awl' made on a flake? somewhat biconvex section; point very prominent, sharp and prismatic.	,,	Quartz,		see BURKITT, *The Old Stone Age* p. 56.
840	,,	Point,	triangular; prismatic; point sharp and long; side edge also sharp.	,,	,,		
841	,,	Scraper,	triangular; prismatic; bevelled edge, much worn; other sides more or less flat.	Large,	Jasper,	snuff.	
842	,,	,,	trapezoid, well faceted, sharp concave edge.	Sm.	Quartzite,	red.	
843	,,	,,	quadrantal; nearly amygdaloid section; well shaped face with a high conical ridge.	Med.	Quartz.		
844	,,	,,	quadrantal; plano-convex; slightly tilted body; rough flaking; straight edge.	Large.	,,		
845	,,	,,	quadrantal; prismatic; Y-shaped ridge on face; all sides have edges.	Med.	,,		
846	,,	,,	square with sides rounded; conchoid of percussion and bulb flaked away on back; plano-convex; well-trimmed face with eminence on one side; sharp edge; well-shaped.	,,	Chert,	greyish like flint.	
847	,,	Scraper,	ovoid, flattish, well flaked face; faceted platform and bulb; edge dull due to weathering (?)	Large,	Chert,	chocolate.	

BHULWAN (SYMBOL 'BV')

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remarks
848	BV	Core,	pointed semi-spheroid.	Med.	Chalcedony,	greyish white.	
849	,,	,,	ovoid; small edge on one side.	,,	Quartz.		
850	,,	,,	lozenge shaped, no edge.				
851	,,	,,	sector of sphere; flaked on face, no edge.	,,	,,		
852	,,	,,	quadrantal, semi-oval section; no edge.	,,	,,		
853	,,	Blade,	amygdaloid; ridged; edges sharp and irregular.	,,	Agate,	bluish white.	
854	,,	,,	elongated-ovoid; very roughly worked face showing much step flaking; sharp irregular edge.	,,	,,	,,	
855	,,	,,	sector of sphere; sharp convex edge.	,,	Chalcedony,	,,	
856	,,	,,	crescentic; worked-back; sharp straight edge.	,,	Agate,	,,	
857	,,	,,	quadrantal; prismatic; smoothly worked; sharp sinuous edge.	,,	Chalcedony,	,,	
858	,,	,,	crescentic; faceted back; worn edges.	Sm.	Rock crystal.		
859	,,	,,	crescentic; straight thick back, sharp convex edge.	,,	Chalcedony,	light grey.	
860	,,	Point,	sector of sphere; sharp edge.	,,	,,	greyish white.	

SIGĀM KANBI (SYMBOL 'SG')

861	SG	Core, (?)	hexagonal; flat-bottomed; sides faceted.	Med.	Quartz.	
862	,,	Point,	amygdaloid; flattish; no edges nor sharp point.	,,	,,	
863	,,	?	semi-circular; cortexed back; face looks as if flaked; no clear edge.	,,	Chalcedony,	white.
864	,,	,,	convex polygonal, Y-shaped ridge on face, one edge sigmoid and other straight.	,,	Agate,	greyish white.
865	,,	?	semi-sector of sphere; perhaps part of a blade or scraper.	,,	Quartz.	
866	,,	,,	rectangular, one side truncated; face and underside smooth, bulb-like surface, bevelled edges.	,,	Chalcedony,	light grey.
867	,,	Point,	pointed oval; flat; broad point.	,,	Quartz.	
868	,,	,,	semi-crescentic; ridged; sharp edge having a point.	,,	Chalcedony,	greyish white.
869	,,	Blade,	rectangular, parallel flake scars on face, sharp side edges.	Sm.	,,	white.
870	,,	Blade cr Scraper,	truncated-ovoid; thick worked-back and sloping side and point, leaving part of cortex on face and back; edge worn.	Large,	,,	(opaque) mtd. white & pale.
871	,,	Ccre,	quadrantal; several flake scars meet in a dull broad point.	Med.	Agate,	grey.
872						
873	,,	Blade,	semi-elliptical, curved and sharp edges.	Sm.	Chalcedony,	white.
874	,,	Scraper,	oblong; slightly concave edge.	,,	,,	white (opaque).

Serial No.	Site	Antiquity Micro.	Description	Size	Material	Colour	Remerks
875	SG	Scraper,	circular, conical; irregular edges; one edge has a natural cavity.	Sm.	Agate,	white.	
876		?	?	?	?	?	
877	„	„	ovoid; ridged, one edge convex, other curved and notched.	„	„	„	
878	„	„	quadrantal; face flaked; rather flat; one side appears as if worn.	„	„	„	
879	„	„	segment of circle; plano-convex, straight sharp edge.	„	„	„	
880	„	„	semi-circular; plano-convex; blunt edge; well flaked face.	„	„	white (opaque).	

APPENDIX II

Catalogue of Excavated Finds

(A) FINDS FROM HIRPURA EXCAVATION (Symbol 'EH')

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
1	EH	I, D I	6″	Micro;	flake or scraper crescentic, worked angular back; sigmoid chord; edge blunt.	Med.	Quartz.		
2	"	"	"	"	flake; quadrantal; flattish; curved, sinuous and sharp edge.	V. Sm.	Chert,	pinkish.	
3	"	"	"	"	flake; elliptical; bulb; irregular and sharp edge.	"	"	brownish.	
4	"	"	10″	"	flake; semi-circular; cortex on rim; all sides plain; no edge.	Med.	Quartz.		
5	"	"	"	"	flake, blade (now partly broken); parallel flake scar on face; bulb; two-edged.	Sm.	"		
6	"	"	"	"	flake, scraper (?); semi-circular; plano-convex; convex edge, sharp on one side.	"	"		
7	"	"	12″	"	flake, triangular; rugged face; bulb; sharp curved edge on a side.	Med.	Quartz,	purplish.	
8	"	"	"	"		Sm.	Iron ore,	chocolate.	
9		"	6″	Potsherd	medium ware, smooth red outer, coarse brown inner; imperfectly fired.	Large,		red.	
10		"	"	"	medium ware, well fired, bright smooth red outside, coarse brown inner.				

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
11	EH	I, D I	6″	Potsherd,	medium ware, well fired bright smooth red outside, coarse brown inner.				
12		”	”	”	”				
13		”	”	”	”				
14		”	”	”	”				
15		”	10″	”	a tiny piece of an everted rim of thick black ware; well fired; wheel-made.				
16		”	”	”	tiny piece, medium ware, coarse dusty black.				
17		”	”	”	”				
18		”	”	”	piece of medium coarse black ware.				
19	”	”	11″	”	piece of thick dusty brown coarse ware.				
20		”	”	”	tiny pieces of medium dull brown ware.				
21		”	”	”	”				
22		”	”	”	”				
23		”	10½″	”	piece of medium coarse black ware.				
24		”	”	”	”				
25		”	”	”	” slightly thinner & coarser.				
26		”	”	”	”				
27		”	”	”	piece of thick coarse black ware.				

28	EH	I, D I	,,	,,	pieces of a rim of medium coarse black ware.			
29		,,	,,	,,	,,			
30		,,	,,	,,	a tiny piece, similar as No. 24–25.			
31		I, D II	1′–4½″	Micro,	flake, blade or scraper; amygdaloid; trapezoid section; parallel step flake scars on face, prominent bulb, platform; one edge irregular and sharp, other notched in the middle.	Large,	Chert,	brownish.
32		,,	,,	,,	flake, scraper (?); triangular; oblique ridge on face; sharp steep edge on one side.	,,	,,	greyish.
33		,,	,,	,,	flake, scraper (?); conical ridge on face cortex on underside and back; no clear edge.	Med.	,,	reddish.
34		,,	,,	,,	flake, point, segment of circle; oblong section; all sides plain; sharp broad point.	,,	Quartz.	
35		,,	,,	,,	flake, blade or scraper; elongated and truncated oval; low mid–ridge; irregular sharp edge.	,,	,,	
36		,,	,,	,,	flake, blade or scraper; semi-cordiform; slender; neatly flaked smooth face; flaked bulb; one edge straight and sharp, other irregular but sharp.	Sm.	Chert,	brownish pink.
37		,,	,,	,,	flake, blade; obliquely truncated oval; two–edged.	,,	Quartz.	
38		,,	,,	,,	flake, blade; rectangular plano–convex; flattish; chisel-like edge.	,,	,,	
39		,,	,,	,,	blade, rectangular; narrow, ridged; two-edged.	,,	Chert,	pinkish.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
40	EH,	I, D II	1′–4½″	Micro,	blade; pointed ovoid; two-edged, sharply pointed.	Sm.	Chert,	pinkish.	
41		,,	,,	,,	blade; rectangular; ridged; two-edged.	V. Sm.	Chalcedony,	cream.	
42		,,	,,	,,	flake, scraper; semi-circular; worked convex arch; rough face; sharp steep straight edge.	Sm.	Chert,	brownish.	
43		,,	,,	,,	flake, scraper (?); triangular; roughly worked, sharp curved edge.	Med.	Quartzite,	,,	
44		,,	,,	,,	blade; sickle-shaped; or (?) shouldered (?); very sharp edge.	Sm.	Chalcedony,	light orange	
45		,,	,,	,,	flake; blade, crescentic; cortex on back, sharp edge.	V. Sm.	Quartz.		
46		,,	,,	,,	blade; rectangular; flat, thin; sharp curved edges.	,,	Chert,	brownish.	
47		,,	,,	,,	flake; blade, amygdaloid; curved serrated-like edge.	,,	Chalcedony,	pinkish.	
48		,,	,,	,,	flake; rectangular; prismatic wavy edges.	,,	Quartz.		
49		,,	,,	,,	flake, scraper; quadrantal; cortex on face; convex, sharp wavy edge.	Sm.	Chert,	purplish.	
50		,,	,,	,,	flake; blade, crescentic, worked-back, straight sharp edge.	V. Sm.	Quartz.		
51		,,	,,	,,	flake, scraper; sub-rectangular; steep ridge, no edge.	V. Sm.	Quartz.		
52		,,	,,	,,	flake; point, sub-triangular; flattish; thin; sharp edge & point.	,,	Chert,	brownish.	

53		,,	,,	,,	flake; point, triangular; sharp point.	,,	Crystal.	
54		?						
55			,,	Bone,	charred; segment of circle.			
56			,,	Micro,	blade; rectangular; straight worked-back, sharp straight edge, pointed at one end.	,,	Chert,	brownish.
57		,,	1′-10″	,,	core, scraper (?); flat-bottomed ovoid pebble, partly flaked on either side to have a sharp concave edge.	V. large,	Jasper,	grey.
58		,,	,,	,,	flake, a pebble chip like a quadrantal, no edge; dull point.	Large,	Quartzite,	dark brown.
59		,,	,,	,,	flake, scraper (?); roughly rectangular, thick; cortex on one side; sharp concave, sloping edge on the other.	,,	Jasper quartzite,	brownish.
60		,,	,,	,,	flake; (a pebble chip), semi-ovoid; cortex on face, one side-edge sharp and irregular, other notched.	,,	,,	,,
61		,,	,,	,,	flake, scraper; (?) trapezium; three sides blunt, one-edged.	,,	,,	grey.
62		,,	,,	,,	flake, (recent fracture at one end), trapezoid, no edge (originally perhaps a crescentic, worked-back, blade).	Med.	,,	purplish.
63		,,	,,	,,	flake, blade; step flaking on face; two irregular sharp edges.	,,	Chert,	reddish.
64		,,	,,	,,	flake; quadrantal; sharp curved edge.	,,	Quartzite,	greyish brown.
65		,,	,,	,,	flake, scraper(?); irregular quadrilateral; flattish; step flaking and a ridge on face; bulb erased; edge slightly curved and sharp.	,,	Chert,	brown.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
66	EH	I, D II	1′-10″	Micro,	flake, point; triangular; prismatic; both edge and point sharp.	Med.	Chert,	pinkish.	
67		,,	,,	,,	flake; quadrantal; thick, cortex arch; sharp edge.	,,	Chalcedony,	cream.	
68		,,	,,	,,	flake; point triangular; cortex on one-thicker-side; sharp undulating edge and point.	Sm.	Quartz.		
69		,,	,,	,,	flake; truncated oval; mid-ridge; bulb, sharp side-edges.	,,	Chert,	pinkish.	
70		,,			flake, rectangular, cortex on face, bulb; chisel-like edge.				Chisel ?
71		?							
72		,,	,,	,,	flake; rectangular, thin, narrow, mid ridge; sharp edges.	V. Sm.	Quartz.		
73		,,	,,	,,	blade, truncated and elongated ovoid, thin, plano-convex, sharp edges.	,,	Chalcedony,	pale.	
74		,,	,,	?					
75		,,	,,	,,	flake, rectangular, thin, narrow, flattish; sharp edge.	,,	,,	pinkish.	
76		,,	,,	,,					
77		,,	,,	,,	flake, rectangular; thin, narrow, mid ridge; sharp edges.	,,	Chert,	brownish.	
78		,,	,,	,,	flake, point; triangular; sharp point.	,,	Quartz.		
79		I, DIII	2′-4″	,,	flake; semi-circular with one end incurved; cortex on face; sharp edge and point.	Med.	Chert,	reddish.	

80	,,	,,	,,	,,	flake, blade, sub-oval; flattish, thin, parallel flake scar on face; bulb; sharp edge.	Sm.	,,	brownish.	
81	,,	,,	,,	,,	flake, point; segment of circle; sharp points.	Med.	,,	reddish.	
82		,,	,,	,,	blade; sub-ovoid; thin, narrow, mid ridge; sharp edges.	Sm.	Chalcedony,	cream.	
83		I, D II	1′–4″	Potsherd,	Similar to No. 27.				
84		,,	,,	,,	Similar to No. 23 above.				
85		,,	,,	,,					
86		,,	,,	,,	piece, medium ware, coarse dusty black, Similar to Nos. 16 and 17.				
87		,,	,,	,,	Similar to No. 23.				
88		,,	,,	,,	Similar to No. 23 above but dusty owing to a thin film of silt and lime carbonate.				
89		,,	,,	,,	Similar to No. 23.				
90		,,	,,	,,	Similar to 83 and 27 above.				
91		,,	,,	,,	Similar to No. 88.				
92		,,	,,	,,	Do.				
93		,,	,,	,,	Do.				
94		,,	,,	,,	Do.				
95		,,	,,	,,	Do.				
96		,,	,,	,,					

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
97	EH	I, D II	1′-4″	Kankar,	natural concretion.				
98		”	”	”	Do.	Large,			
99		”	”	”	Do.	”			
100		”	”	”	Do.	”			
101		”	”	”	Limonite coated silt.				
1 2		”	”	”	Do. kankar ?				
103		”	”	”	Do.				
104		”	”	”	Do.				
105		”	”	”	Do.				
106		”	1′-4½″	Potsherd,	Similar to No. 10 above.				
107		”	”	”	Similar to No. 20 above, dull brown.				
108		”	”	”	tiny piece of a rim (?), thick, dull brown outside, black inside.				
109		”	”	”	Similar to No. 9.				
110		”	”	”	thick, imperfectly fired, coarse red on both sides.				
111		”	”	”	Similar to No. 107 above.				
112		”	”	”	Similar to Nos. 16–17 above.				
113		”	1′-4″	”	tiny piece, medium, bright red outside, black inside.				
114		”	1′-10″	”	Similar to Nos. 28 and 29 above.				

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115		,,	,,	,,	Do.				
116		,,	,,	,,	Do.				
117		,,	,,	,,	Do.				
118		,,	,,	,,	small piece, medium ware, dusty coarse brown on both sides.				
119		,,	,,	,,	piece of a rim (?), thick, light chocolate, smooth on one side.				
120		,,	,,	,,	Similar to Nos. 28 and 29 & 114–17 above.				
121		,,	,,	,,					
122		,,	,,	,,	.				
123		,,	,,	Stone,	artifact; fractured piece of pebble.	V. Large,	Quartzite,	brownish grey.	
124		,,	,,	,,	flake from a pebble, scraper; segment of circle.	,,	,,	,,	
125		,,	,,	Clay,	shaly; piece.			yellowish brown.	
126 to 130		D 3	2′-3″	,,	,, pieces.			,,	For Micros see Nos. 79–82.
131		,,	2′-4″	Sand-stone,	charred (?) small pieces.			chocolate.	
132					Limonite coated sand.			,,	
133									
134 to 138		D 2	1′-10″	Bo:e pieces,	all f:ssilized. No. 136 is charred also.				
139		D 3	2′-4″	Silicious sand-stone,	worked ?	V. Large,		yellow.	

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
140	H.	I, D III	2′-4″	Stone artifact,		V. Large,	Quartzite,	brownish.	
141		,,	,,	,,	core (?) triangular; mid-ridge; flat pebble surface on rest.	,,	Vein Quartz,		
142		,,	,,	Micro,	flake, scraper (?); semicircular; worked arc.	Large,	Chert,	, flesh.	
143		,,	,,	,,	flake, scraper; trapezoid; pyramidal; sharp broad edge.	Med.	,,	light grey.	
144		,,	,,	,,	flake; trapezoid; flatish bevelled edge.	,,	,,	brownish with reddish inclusions.	
145		,,	,,	,,	flake, scraper (?) rectangular, thick, face has polished surface ending into a bevelled edge.	,,	,,	greyish brown.	
146		,,	,,	,,	core; amorphous, rude.	,,	,,	reddish brown.	
147		,,	,,	,,	flake; triangular with irregular chord; rough step flaking on face; sharp edge.	,,	,,	purplish brown.	
148		,,	,,	,,	flake, scraper; irregularly cordiform; flattish; face roughly worked; bulb; sharp irregular edge.	,,	,,	dark grey.	
149		,,	,,	,,	flake, point; square, flattish; sharp edge and point.	,,	Quartz.		
150		,,	,,	,,	flake, point; scalene trapezoid; (pebble chip); sharp edge and point.	,,	,,		
151		,,	,,	,,	flake, crescentic with a truncated point; quadrantal section.	,,	,,		

152		,,	,,	,,	flake; blade, crescentic, thick worked back, sharp edge.	,,	,,	greyish brownish.
153		,,	,,	,,	blade; crescentic, thin and flattish; sharp edge and point.	Sm.	,,	,,
154		,,	,,	,,	blade; sub-rectangular; sharp edges.	,,	,,	orange.
155		,,	,,	,,	blade; elongated oval; thin, flat, narrow; mid-ridge, bulb; sharp edges.	,,	Chalcedony,	pinkish.
156		,,	,,	,,	blade; trapezoid; flattish; thin, sharp edges.	,,	,,	,,
157		,,	,,	,,	blade; very oblong; very thin and narrow, mid-ridge; one side slightly worked; other sharp edged.	V. Sm.	,,	,,
158		,,	,,	,,	blade; oblong; thin, and narrow, one edge straight & other irregular.	,,	Chert,	,,
159		,,	,,	,,	blade; (crescentic) tapering to form a point; worked-back; sharp straight edge and point.	,,	Chalcedony,	,,
160		,,	,,	,,	blade; crescentic; tilted; fine sharp edges.	,,	Chert,	,,
161		,,	,,	,,	blade; crescentic, thin, sharp edge.	,,	Quartz.	
162		,,	,,	,,	blade; trapezoid; incurved edge.	,,	,,	
163		,,	,,	,,	blade; truncated ovoid; ridged, irregular sharp edge.	,,	,,	
164		,,	,,	,,	blade; crescentic, ridged; sharp edge.	,,	Chert,	pinkish.
165		,,	,,	,,	flake point; amygdaloid; thick at butt, broad; sharp point.	Sm.	Quartz.	
166		,,	,,	,,	flake, scraper; semi-oval; pyramidal, sharp uneven edge.	,,	Chalcedony,	cream.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
167	H.	I, D III	2′–4″	Micro,	flake; semi-crescentic; thick cortexed back; sharp edge.	Sm.	Chalcedony,	brown.	
168		,,	,,	,,	flake; scraper, semi-circular, thin, flattish; sharp edge.	,,	Chert,	greyish.	
169		,,	,,	,,	flake; point (?) irregularly quadrilateral; one end pointed.	V. Sm.	,,	pinkish.	
170		,,	,,	,,	flake; trapezoid with one corner pointed.	,,	,,	,,	
171		,,	,,	,,	flake; obliquely truncated oval.	,,	,,	,, brown.	
172		,,	2′–10″	Stone artifact,	core; amorphous; rude.	V. large,	Jaspery Chert,	light purplish.	
173		,,	,,	,,	core, scraper; crescentic (boot-shaped), large 'step' scar on face; sharp concave edge.	,,	Quartz		
174		,,	,,	,,	core, scraper; roughly circular; partly well flaked on either side to have an irregular edge.	,,	Quartzite,	greyish.	
175		,,	,,	,,	flake; fish-tail-shaped; sharp irregular edge.	,,	,,	(coarse) yellowish.	
176		,,	,,	,,	flake; ovoid: mid-ridge; cortex on back; sharp edge.	Med.	Jasper,	brownish.	
177		,,	,,	Micro,	core; semi-circular, rather broad.	,,	Chert,	greyish brown.	
178		,,	,,	,,	core; scalene-triangular; bevelled edges on two sides.	,,	,,	,,	
179		,,	,,	,,	flake; roughly trapezoid with a side shouldered; plano-convex; sharp edge.	,,	,,	flesh.	

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180		,,	,,	,,	flake; (pebble chip), semi-circular.	Sm.	Quartz.	
181		,,	,,	,,	flake, scraper (?); trapezoid; mid-ridge; bulb, platform; very sharp edge.	Med.	Jasper,	brown.
182		,,	,,	,,	flake; triangular; sharp uneven edge.	,,	Jaspery Chert,	mottled brown.
183		,,	,,	,,	flake; sub-triangular; bulb; sharp edges and point.	Large,	Chalcedony,	brownish.
184		,,	,,	,,	flake; crescentic, worked-back; erased bulb; sharp curved edge and point.	Med.	Chert,	pinkish.
185		,,	,,	,,	flake, blade; segment of a circle; low curved ridge; flaked underside; sharp convex edge and point.			
186		,,	,,	,,	flake; sub-triangular; face has part of cortex, half of rest slightly flaked; other front half deeply flaked into a sharp side.	,,	,,	greyish pink.
187		,,	,,	,,	flake; blade; crescentic; worked-back; irregular edge.	Sm.	,,	pinkish.
188		,,	,,	,,	flake; ovoid; slightly concavo-convex; an eminence on face; curved sharp edge.	,,	Quartz,	,, brown.
189		,,	,,	,,	blade; trapezoid-elongated; low ridge; sharp edge.			
190		,,	,,	,,	flake; blade; thin, narrow, low mid-ridge, two-edged; one edge has a concavity.	V. Sm.	Chert,	greyish brown.
191		,,	,,	,,	flake, blade, crescentic, worked-back; sharp edge.	,,	,,	brownish pink.
192		,,	,,	,,	blade; ovoid; thin and flattish, two edged.	,,	,,	brownish.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
193	H.	I, D III	2′–10″	Micro,	blade; rectanuglar; low ridge; low bulb; edge sharp but a little uneven because of a slight retouch (?) shown on the under side.	Sm.	Chalcedony,	ivory.	
194		,,	,,	,,	blade; trapezoid; sharp edge.	V. Sm.	Chert,	dark grey.	
195		,,	,,	,,	blade; triangular; thin and narrow; sharp edge.	Sm.	,,	brown.	
196		,,	,,	,,	blade; crescentic, worked-back; sharp edge and point.	V. Sm.	,,	,,	
197		,,	,,	,,	flake; point; triangular; sharp point.	,,	,,	,,	
198		,,	,,	,,	blade; ovoid; thin and flat flake scars on face; sharp edge.	,,	,,	,,	
199		,,	3′	,,	flake; (pebble chip); roughly rectangular with tilted body; sharp, uneven edge.	Large,	Quartz.		
200		,,	,,	,,	flake, crescentic, roughly flaked sides; sharp sinous edge.	,,	Chert,	greyish brown.	
201		,,	,,	,,	flake; amygdaloid; thick; no clear edge.	Med.	Quartz.		
202		,,	,,	,,	flake, scraper (?); truncated cone sharp edge.	,,	Chalcedony,	reddish.	
203		,,	,,	,,	blade; truncated oval; thin & flattish; parallel flaking on face; bulb; sharp edges.	Med.	Chert,	brownish pink.	
204		,,	,,	,,	flake; quadrilateral trapezium; ridged; sharp edges.	,,	,,	pinkish brown.	
205		,,	28″	Bone,	long piece, fossilized.				
206		,,	,,	,,	long piece, part of No. 205.				

207		,,	,,	,,	small chip, fossilized.				
208		,,	,,	,,	small piece, ,,				Imple-ment?
209		,,	,,	,,	flat quadrantal piece; one side has a smooth sloping edge.				
210		,,	,,	,,	small, semi-crescentic piece; faceted (?) and slightly charred.				Imple-ment? See Text, p. 143.
211		,,	34″	,,					
212		,,	,,	,,					
213		,,	,,	,,					
214		,,	,,	,,					
215		,,	,,	,,	Bone pieces, semi fossilized.				
216		,,	,,	,,					
217		,,	,,	,,					
218		,,	36″	,,					
219		,,	,,	,,					
220		,,	,,	,,					
221		,,	28″	Rock,	a pestle ? an elongated oval pebble.	$4'' \times 1\frac{5}{8}''$	Quartzite,	brown.	
222		,,		,,	triangular piece.	2″	Grit,	brownish.	
223		,,		,,	roughly a segment of sphere.	3″	Sandstone,	blackish.	
224		,,		,,	very irregular piece.	1″	laterite,	reddish.	
225		,,	36″	flake,	a pebble piece, roughly a sector of sphere.	V. large,	Sandstone,	,,	

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
226	H.	I, D III	36″	flake,	a pebble chip, scalene trapezium.	Large,	Quartzite,	brownish.	
227		,,	,,	,,	a pebble chip, trapezoid.	,,	,,	,,	
228		,,	,,	,,	a pebble piece, pyramidal.	,,	Vein quartz.		
229		,,	,,	Rock,	a shingle.	Med.	Trap (?),	grey.	
230		,,	,,	,,	Loose sandstone.				
231		,,	,,	Core,	irregular.	Large.	Sandstone,	purplish.	
232		,,	34″	Rock,	piece of stone.	Med.	Earthy, haematite.		
233		,,			sandstone piece.				
234		,,	,,	,,	piece of stone.	Large,	,,		
235		,,	,,	,,		Med.	,,		
236		,,	,,	,,	haematite (iron oxide or red ochre).	,,	,,		
237		,,	,,	,,		Sm.	,,		
238 to 244		,,	28″	,,	Limonite coated sand.	Med.		Yellowish brown.	
245		,,	,,	,,	,, very small pieces.			,,	
261		,,	,,	,,	Limonite coated sand.			,,	
262 to 265		,,	34″	Kankar,					

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266 to 271		,,	28″	Rock,	Limonite-coated silt.	Iron oxide,		Dark, red and yellowish.
272			32″	Pot-sherd,	Thin, reddish ware; dull yellowish core; and greyish on both sides.			Red
273				,,				,,
274				,,	Tiny piece of a reddish ware; dull greyish core; reddish on both sides.			,,
275			30″	,,	charred bone, small piece.			
276		I, D IV	38″	Micro,	scraper, triangular	Large,	Quartzite,	brownish.
277		,,	,,	,,	core, scraper, convex-polygonal, cortex on face.	,,	Chert,	dark brown.
278		,,	,,	,,	blade, rectangular; thick, worked side; irregular edge.	,,	,,	mottled brown.
279		,,	,,	,,	core, long tapering, trapezoid section.	,,	,,	brown.
280		,,	,,	,,	blade, or scraper, ovoid, flaked face; edge sharp.	Med.	,,	purplish.
281		,,	,,	,,	point, triangular; parallel flake scar on face.	,,	Quartz.	
282		,,	,,	,,	scraper, amygdaloid flattish; sharp edge.	,,	Chert,	brown.
283		,,	,,	,,	scraper, sector of circle; thick sharp edge.	,,	,,	brownish.
284		,,	,,	,,	point, trapezoid, flattish; bulb; sharp edge and point.	,,	,,	greyish brown.
285		,,	,,	,,	scraper, cordiform, flattish thin, sharp edge.	,,	,,	speckled brownish.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
286	H.	I, D IV	38″	Micro,	blade, semi-crescentic, partly ridged, fine bulb; sharp edges.	Med.	Chert,	brown.	
287		,,	,,	,,	scraper (?), crescentic, all sides blunt, butt end pointed and sharp.	,,	,,	,,	
288		,,	,,	,,	blade, crescentic with curved point; worked-back; sigmoid sharp edge.	,,	,,	,,	
289		,,	,,	,,	scraper, segment of circle, flattish, sinuous convex edge.	,,	Quartz.		
290		,,	,,	,,	scraper, obliquely truncated ovoid, plano-convex, well worked face showing parallel facets and step flaking at one place, edge sharp.	,,	Chert,	brownish.	
291		,,	,,	,,	scraper, amygdaloid, plano-convex.	,,	Quartz.		
292		,,	,,	,,	blade, rectangular, semiridged, sharp edge.	,,	Chert,	brown.	
293		,,	,,	,,	point, (pebble chip) crescentic, long and broken point.	,,	Quartz,	,,	
294		,,	,,	,,	flake, blade, thin, narrow, ridged, sharp edges.	V. Sm.	Chert,	,,	
295		,,	,,	,,	blade, rectangular, prismatic, sharp edge.	,,	,,	reddish.	
296		,,	,,	,,	flake, segment of circle.	,,	,,	brownish.	
297		,,	,,	,,	scraper or blade, truncated segment of circle, thin and flattish, sharp edge.	Sm.	,,	brown.	
298		,,	,,	,,	blade, rectangular, ridged sharp edges.	,,	,,	,,	

299		,,	,,		blade, obliquely truncated semi-oval; ridged; bulb; sharp edges.	,,	,,	light brown.
300		,,	,,	,,	blade or scraper, thin and flat; trapezoid; sharp edge.	,,	,,	brownish.
301		,,	,,	,,	point, pointed oval, elongated.	,,	Quartz.	
302		,,	,,	,,	blade, rectangular, thin, narrow, bulb, sharp edges.	,,	,,	purple.
303		,,	39″	,,	blade or scraper, irregularly ovoid, thin and flat; sharp edges.	Med.	,,	mottled brownish.
304		,,	41″	,,	flake, scraper; convex polygonal; broad, flat platform on face; bulb.	V. large,	,,	greyish brown.
305		,,	,,	,,	flake; irregular; pebble surface on one side.	Med.	,,	
306		,,	,,	,,	core; irregularly spheroid; flaked all over.	Large,	Chert,	brownish.
307		,,	,,	,,	core; irregularly conical; parallel flakes on side to form a well serrated and sharp edge by intersection with plain flat base.	Med.	Siliceous sandstone,	brown.
308		,,	,,	,,	flake, square; mid-ridge; blunt edges.	,,	Quartzite,	purple.
309		,,	,,	,,	flake, trapezoid, well-flaked face, sharp edges.	,,	Chert,	mtd. purplish.
310		,,	,,	,,	flake, double convex; flattish and tilted; bulb; irregular edge.	,,	,,	brown.
311		,,	,,	,,	flake; roughly pointed oval; thick on one side with cortex; sharp sloping edge on the other.	,,	,,	brownish red.
312		,,	,,	,,	flake, tapering ovoid; plano-convex; blunt (roughly trimmed) edge.	,,	,,	pinkish.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
313	H.	I, D IV	41″	Micro,	flake, blade, tapering ovoid, elongated; cortexed back; bulb; sharp edge.	Med.	Chert,	mtd greyish.	
314		"	"	"	flake, irregularly crescentic; worked-back; sharp curved edge and point.	"	"	brown.	
315		"	"	"	flake, sub-triangular; tapering mid-ridge; cortex on part of face; bulb; sharp edges and point.	Large,	"	"	
316		"	"	"	flake; quarter of an oval; prismatic; sharp uneven edge.	Med.	"	greyish brown.	
317		"	"	Rock,		"	Iron ore.		
318		"	"	Micro,	core; semi-circular; cortex rim on one side; roughly flaked.	"	Vein Quartz.		
319		"	"	"	flake; lenticular; plano-convex; very rough.	"	Sand stone,	brownish.	
320		"	"	"	flake, triangular; no working part.	"	"		
321		"	"	"	blade and point; triangular; worked angular back; sharp edge and point.	"	Chert,	brownish pink.	
322		"	"	"	flake, scraper; semi-circular; thick, worked arch; sharp edge.	"	Chalcedony,	buff.	
323		"	"	"	point; pointed oval, sharp point.	"	Chert,	pinkish.	
324		"	"	"	flake; amygdaloid; very sharp curved edges.	Sm.	Chalcedony,	light brown.	
325		"	"	"	core; rectangular, semi-circular section; roughly worked.	"	Chert,	grey.	
326		"	"	"	flake; point; sub-triangular; low mid-ridge; dull point.	"	Vein Quartz.		

62

327		”	”	”	point; triangular; plano-convex; very sharp point at one end, and slightly pointed at other.	V. Sm.	Chert,	light pink.	
328		”	”	”	blade, semi-crescentic; worked blade; sharp edge and point.	”	”	pinkish brown.	
329		”	”	”	blade; quarter of an oval; sharp edge.	Sm.	”	brownish.	
330		”	”	”	flake; triangular; mid-ridge; sharp edges, dull point.	V. Sm.	Quartz.		
331		”	”	”	blade; trapezoid; thin and flattish; bulb, very sharp edge.	”	Chalcedony,	light brown.	
332		”	”	”	blade; tapering oval; thin and flattish; very sharp edge.	”	Chert;	brownish.	
333		”	”	”	flake; crescentic; worked-back; sharp edge.	”	”	dark grey.	
334		”	”	”	scraper; triangular with one corner rounded; thin and flattish; sharp edge.	Sm.	”	brownish.	
335		”	”	”	scraper; quadrantal; flattish; sharp irregular edge.	Med.	Quartz.		
336		”	”	Bone-piece,	fossilized; ridged (?) and one side well faceted.	V. Sm.			
337		”	44″	Micro,	core-scraper; circular; flaked all over; blunt edges.	Large,	Chert,	brownish pink.	Like an implement. See Text, p. 143
338		”	”	”	flake scraper; segment of sphere; steeply flaked convergent sides.	Med.	Quartzite,	chocolate.	
339		”	”	”	flake, blade or scraper ? semi-oval; lenticular; bulb; sharp edges.	”	Chert,	flesh.	
340		”	”	”	blade; segment of circle; prismatic; sharp curved edge.	”	”	pinkish brown.	

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
341	H	I, D.IV	44″	Micro,	blade; elongated ovoid; plano-convex; one edge irregular, other even.	Med.	Quartz.		
342		„	48″	„	scraper; oval; thick cortex rim on one side, sharp sinuous edge.	„	Quartz with a film of silt,	brownish.	
343		„	„	„	scraper; lozenge shaped; prismatic, rough.	Large,	Do.		
344		„	„	„	point, or blade; parrot-beak shaped; steep, curved ridge, sharp edge.	„	Chert,	purplish.	
345		„	„	„	blade; rectangular; cortex on back, sharp edge.	Med.	„	mtd. brownish.	
346		„	„	„	flake, rectangular; plano-convex; sharp edge on one side.	„	„	pinkish.	
347		„	„	„	point and blade; scalene trapezium; thin and flattish; sharp edge and point.	„	„	„	
348		„	„	„	blade, rectangular; transverse ridge; cortex on face; sharp edge.	„	„	speckled grey.	
349		„	41″	Pebble,	fractured, flat-bottomed oval.	Sm.	Quartzite,	brown.	
350		„	„	Rock,	freestone.	„	Sandstone,	„	
351		„	„	„	Do.	Large,	With brown film of silt,	„	
352		„	„	„	nodule.	Sm.	Quartz.		
353		„	48″	„	Iron ochre.	„	Haematite,	dark red.	
354		„	41″	Shell,					
355		„	38″	Bone,	Fragment; fossilized.				

356		,,	,,	,,	,,			
357		,,	,,	,,	,,			
358		,,	,,	,,	,,			
359		,,	41″	,,	,,			
360		,,	,,	,,	,,			
361		,,	,,	,,	,,			
362		,,	,,	,,	,,			
363		,,	,,	,,	,,			
364		,,	,,	,,	,, } Three tiny pieces charred.			
365		,,	,,	,,	,,			
366		,,	,	,,	,,			
367		,,	44″	,,	,,			
368 to 375		,,	38″	,,	small grains of granite.			
376		,,	41″	Rock,	granite.			
377		,,	,,	,,	,,			
378		,,	44″	,,	,,			
379		,,	,,	,,	,,			
380		,,	,,	Shell,				
381		,,	,,	,,				
382		,,	,,	Kankar,				

Serial No	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
388 to 391		I, D IV	42″		4 miscellaneous unidentified pieces.				
392		I, D V	51″	Micro,	scraper; pointed oval, thick at the narrower end; bulb and platform; sharp irregular edge.	Large,	Vein Quartz with a film of "silt".		
393		,,	,,	,,	flake, trapezoid; very irregular edge.	Med.	,,		
394		,,	,,	,,	flake; wedge-shaped; thin and flattish; erased bulb; sharp undulating edge.	,,	Chert,	pinkish brown.	
395		,,	,,	,,	blade; crescentic, worked low back; incurved edge.	,,	,,	mtd. pinkish.	
396		,,	,,	,,	triangular, flattish; blunt edge.	,,	Quartz,		
397		,,	,,	,,	semi-crescentic; low mid-ridge, sharp sinuous edge.	Sm.	,,	greyish.	
398		,,	52″	Rock,	irregularly angular piece encrusted with carbonate of lime.	Med.	Quartzite,		
399		,,	,,	,,	a piece of pebble, roughly triangular, encrusted as in No. 398.	,,	Iron stone.		
400		,,	,,	Micro,	a pointed flake, really pebble chip, triangular; encrusted.	Large,	Chert,	brownish.	
401		,,	,,	,,	core; rectangular; quite prismatic; encrustated.	Sm.	,,	mtd. grey.	
402		,,	,,	,,	flake; irregularly amygdaloid; sharp edge, encrustated.	Med.	,,	greyish.	
403		,,	,,	,,	flake; pebble chip, semi-oval; sharp edge	,,	Quartz.		

404		,,	,,	,,	flake; rectangular conical; sharp edge.	,,	,,	
405		,,	,,	,,	point, wedge-shaped; unsharp points.	Sm.	Chert,	reddish.
406		,,	,,	,,	flake; lozenge-shaped; flattish; encrustated.	,,	Quartz.	
407		,,	,,	,,	flake; blade; triangular; sharp edges; encrustated.	,,	Chert,	purple.
408		,,	,,	,,	scraper or blade; semi-crescentic; sharp incurved edge; encrustated.	Med.	,,	orange.
409		,,	54″	,,	flake; triangular; thick and narrow at one end; sloping at the other; sharp straight cutting edge; encrustated.	,,	Quartz.	
410		,,	,,	,,	blade; elongated oval; thick worked-back; irregular sharp edge.	Large,	Chert,	pinkish.
411		,,	,,	,,	blade; sub-triangular; flattish; sharp sloping edge; encrustated.	,,	,,	purple.
412		,,	,,	,,	core; amygdaloid; slightly encrustated.	Med.	,,	greyish brown.
413		,,	,,	,,	flake; amygdaloid; flattish; sharp edge.	Sm.	,,	light brown.
414		,,	57″	,,	flake, blade or scraper; triangular; sharp edge; encrustated.	,,	,,	dark grey.
415		,,	,,	,,	flake; trapezoid; semi mid-ridge; sharp edges and point; encrustated.	,,	,,	ivory.
416		,,	,,	,,	flake; point, triangular.	V. Sm.	Quartz.	
417		,,	59″	,,	flake; ovoid; thin and flattish; erased bulb; sharp edges.	,,	Chert,	brownish pink.
418		,,	,,	,,	flake; truncated oval with a notch on one side; thin and flat; encrustated.	,,	,,	purplish.

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
419 to 424	H	I, D V	51″		Packet containing very small fragments of earthy haematite, some of them have a dark black coating.				
425 to 429		”	”		Packet containing fossilized bone pieces, some of them slightly charred.				
430 to 440		”	52″		Packet containing charred bone fragments of small size.				
441-43			”		Do. (charred bone pieces, one cut like an implement.)				
444 to 449		”	54″		Packet containing bone fragments, all fossilized; one charred.				
450		”	57″	Rock,	earthy haematite.				
451 to 465		”	51″		Packet containing shells.				
466 to 469		”	52″		Tin containing shells and Kankar.				
470 to 476		”	57″		Two kinds of shells: Helix and Gastropod.				
477 to 483		”	59″		Do.				

484		I, D VI	65″	Micro,	flake; triangular, thick; sharp sloping edge on the hypotenuse.	Med.	Chert,		
484a			62″		Tin containing Kankar.				
484b			65″		,, ,, ,,				
					PIT O.				
485	H	O,	D I	Micro,	core, triangular; cortex on part; pointed.	Med.	Quartz.		
486		,,		,,	scraper; ovoid; prismatic.	,,	,,		
487		,,		,,	core, irregularly triangular.		Crystal.		
488		,,		,,	core, crescentic; roughly worked.	,,	Chert,	reddish.	
489		,,		,,	flake, elongated ovoid.	,,	Quartz.		
490		,,		Potsherd,	part of rim of a plate, imperfectly fired; remains of dull light brown incised or impressed decoration towards the centre.				Thicker & coarser than No. 497a-1.
491		,,		,,	Do. part of central portion.				
492		,,		,,	part of rim of a plate without decoration.				
493		,,		,,	piece of blackish ware $\frac{1}{8}$ inch thick; coarse, dust brown on surface.				
494		,,		,,	a piece of thinner $\frac{1}{8}$ inch thick; dull brown-black like that of cowdung cake.				
495		,,		,,	Similar as No. 493.				
496		,,		,,	Do.				

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
497	H	O,	D I	Potsherd,	a piece of thinner black ware, smooth on surface, coarse inside.				
497a 1 & 2		,,		,,	two pieces of rim of a dish: fine black ware, smooth on both sides, coated dull brown outside; wheel-made.				
497b		,,			part of above.				
498		,,		Micro,	scraper fashioned out of a pebble.	Large,	Quartzite,	reddish brown.	
499		,,		Rock,	sandstone.				
500		,,			Carbon (?)				
501		,,	D II	Micro,	flake, irregular; sharp edge.	Med.	Quartz.		
502		,,		Potsherd,	portion of a thick rimmed black dish (?) now dull brown on both sides; wheel-made.				
503		,,		,,	small piece of red thin ware, smooth, dark red outside, earthy coarse inside.				
504		,,		,,	a tiny piece of a thin, rimmed, brownish ware; smooth on both sides.				
505		,,		,,	Similar to No. 503 in texture, but blackish.				
506					Do.				
507		,,		Rock,	small pebble of oval shape.	2½″ × 1¾″	Quartzite.		
508		,,		Stone,	a flat pebble flake, trapezoid.	3″ × 2″	,,	brownish.	
509		,,		,,	pebble chip, amygdaloid.	1⅝″ × 1¼″	,,	pinkish brown.	

510		,,		,,	a pebble chip, quadrantal.	$2''x1\frac{1}{8}''$	Quartzite,	brownish.	
511		,,		,,	a pebble ; crescentic with one end truncated.	$2\frac{1}{4}''x1\frac{1}{8}''$	Sandstone,	reddish.	
512		,,		,,	fragment.		,,	,,	
513		,,			a small lump of iron ore.				
514		,,	D III	Core,	very rough and irregular pebble cortex on face, whitish.	V. Large,	Chert,	purplish grey.	
515		,,		,,	Mixture of haematite and limonite coated sand.	Large,		brownish.	
514		,,		Micro,	core, irregular, slightly flaked.	,,	Vein quartz,	brownish.	
517		,,		,,	core-like thick flake; sharp edges.		Chert.	mtd. brown and white.	
518		,,		,,	core, ovoid; flaked all over; sharp edge on one side.	Med.	Vein quartz.		
519		,,		,,	flake, scraper ? wedge-shaped with irregularly truncated sides; flattish; rough edge.	,,	Chert,	purplish.	
520		,,		,,	scraper; ovoid; thick cortex on one side; blunt edge.	Large,	Quartz.		
521		,,		,,	scraper (?); triangular; part of face well flaked; has cortex; sharp edges.	,,	Chert.	mtd, dark brown.	
522		,,		,,	flake; quadrantal; uneven parallel flake scar on face; bulb; sharp irregular edges.	Med.	,,	brown,	arrow head-like.
523		,,		,,	flake, sector of circle; thick and narrow on one end; sharp sloping edge on the other.	,,	,,	grey.	

Serial No.	Site	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
524	H	O,	D III	Micro,	point; semi-crescentic; worked-back; sharp edge and point.	Sm.	Quartz (pure)		
525		,,		,,	flake; ovoid, thin and flattish; sharp edges.	,,	Chert,	purplish.	
526		,,		,,	flake; trapezoid; ridged; sharp edges.	Sm.	Quartz.		
527		,,		,,	flake; amygdaloid; thin and flat.	V. Sm.	Chalcedony,	white.	
528		,,		,,	flake, trapezoid; flattish; sharp edges.	,,	Chert,	mtd. pink and grey.	
529		,,		,,	point, triangular; flat-pyramid; sharp points.	Sm.	Quartz.		
530		,,		,,	blade; elongated ovoid; ridged; sharp edges.	Med.	,,		
531		,,		,,	flake; scalene trapezium; thick back, steep sloping edge.	,,	,,		
532		,,		,,	flake; rectangular; ridged; sinuous edge.	,,	,,		
533		,,		Bone,	fragment, fossilized.				
534 and 535		,,		Rock,			Sandstone, ferruginous,	dark purple.	
536					Terra-cotta piece, broken and rubbed (?)				
537		,,		Micro,	blade; crescentic, worked-back; sharp sinuous edge.	Sm.	Quartz.		
538		,,		,,	scraper; trapezoid; sharp sloping edge.	,,	,,		

539		,,			A packet containing shells (Helix)				
540–44					A packet containing shells spiral (Gastropod).				
545–52					A packet containing shells (Helix and Gastropod).				

PIT II

553	H	II,	D I		Iron slag.	V. Large,			
554–56		,,			a packet containing three small nodules of Kankar.				
557		,,		Kankar,	nodule of big size.				
558		,,			A very large flaked piece of pebble.		Quartzite,	brownish grey.	
559		,,	D II	Micro,	An irregular flake, roughly wedge-shaped.		Quartz.		
560		,,			A small pebble.		Quartzite,	grey (brownish).	
561		,,		Bone,	a small piece, semi-fossilized.				
562		,,			small potsherds.			brick red.	
563		,,			Do.			,,	
564		,,	D III	Micro,	flake; trapezoid; thick worked-back; sharp edge.	Med.	Chert,	chocolate brownish.	
565		,,		,,	core; triangular.				
566		,,		,,	flake, semi-elleptical; sharp edge.	Med.	Quartz.		
567–69		,,			A packet containing three small potsherds.			dull brick red.	
570		,,	D IV	Micro,	flake, quadrantal; prismatic; sharp, fan-shaped bevelled edge.	Med.	Quartzite,	chocolate.	

(B) FINDS FROM LANGHNAJ EXCAVATIONS

MOUND I PIT I

Abbreviation $\frac{EL}{1}$ = Excavated antiquities, Langhnaj, Mound I

DI = Depth from datum level to 1 foot level.

Serial No.	Pit	Level	Antiquity	Description	Size	Material	Colour	Remarks
1	$\frac{EL}{1}$	DI,0-1′	Micro,	scraper, (?) pebble fracture, subsequently flaked, amygdaloid; curved and smooth face; step flaking on back, sharp side edges.	Large,	Chert,	mtd. pale.	
2	”	”	”	flake; amygdaloid; cortex on face; bevelled side edge; rough flaking.	Med.	”	brown with pale patches.	
3								
4	”	”	”	core; sector of oval; quite prismatic; all sides form sharp edges.	”	”	brownish.	
5	”	”	”	flake; amygdaloid; prismatic; no edges.	”	” thinly encrustated.	greyish.	
6	”	”	”	flake; triangular; pyramidial; edges blunt.	”	”	pinkish with grey & purple stains.	
7	”	”	”	flake; quadrantal; thick; mid ridge; bulb and platform; edges blunt.	Sm.	”	buff.	
8	”	”	”	blade or scraper; scalene trapezium; twisted body; face well flaked; edges sharp.	Large,	Quartzite,	purple.	
9	”	”	”	scraper; slightly oval with one end tectiform; flattish; edge blunted except at one, where it has bevelled edge.	Med.	Chert,	greyish.	

10	,,	,,	,,	scraper; discoid; plano-convex; face has cortex all over, sharp circular edge.	,,	,,	orange.
11							
12	,,	,,	,,	flake; quadrantal; plano-convex; sharp edge; roughly worked.	,,	Silicious Sandstone	dark brown.
13	,,	,,	,,	flake, crescentic, thick back; sharp edge.	,,	Chert,	flesh.
14	,,	,,	,,	flake, blade, crescentic, pointed at one end.	,,	,,	light grey.
15	,,	,,	,,	flake, sector of sphere; sharp sides.	Sm.	,,	buff.
16	,,	,,	,,	flake; trapezoid; flattish; blunt edge and point.	,,	,,	flesh.
17	,,	,,	,,	flake, quarter of oval; thick back; sharp edge.	,,	,,	,,
18	,,	,,	,,	blade, crescentic, worked-back; sharp edge.	,,	,,	pinkish red.
19	,,	,,	,,	flake, blade ovoid, with one side truncated; sharp sigmoid edge.	Med.	,,	pinkish.
20	,,	,,	,,	flake; crescentic; face roughly flaked.	Sm.	,,	yellowish brown.
21	,,	,,	,,	flake, discoid, double convex; well flaked face; bulb and platform.	,,	,,	brownish.
22	,,	,,	,,	blade; roughly crescentic, shouldered; mid-ridge; sharp edges.	,,	Greenstone,	dark green.
23	,,	,,	,,	blade; segment of circle with a point truncated; prismatic; sharp edge and point.	,,	,,	brown.
23A	,,	,,	,,	blade; roughly crescentic, mid-ridge; sharp edges.	Med.	Chert,	grey.
24	,,	,,	,,	blade, crescentic with a shoulder; worked back; sharp edge.	Med.	Chert,	flesh.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
25	EL/1	D I 0-1′	Micro,	flake; blade; elongated amygdaloid; prismatic, sharp edge and point.	Sm.	Lydian.		
26	,,	,,	,,	blade (?) roughly rectangular; narrow ridge; smooth and polished by use. grinder(?)	,,	Chert,	red with stains.	
27	,,	,,	,,	flake, blade; club-like, narrow at one end, thick at another; sharp edge.	,,			
28	,,	,,	,,	flake, lozenge-shaped; sharp edge and point.	,,	Quartz (pure)		
29	,,	,,	,,	flake; equilateral-triangular; thick point, sharp sloping edge.	,,	Chalcedony,	pinkish.	
30	,,	,,	,,	flake, segment of circle, worked-back; sharp edge.	V. Sm.	,,	cream.	
31	''4	,,	,,	flake, segment of circle, sharp pointed.	,,	Chert	burnt.	
32	,,	,,	,,	flake, crescentic, worked-back, sharp points and edges.	,,	Chalcedony	cream.	
33	,,	,,	,,	flake, parrot-beak shaped, flat and thin, very sharp edge and point.	,,	,,	light pink.	
	,,	,,	,,	flake, blade, trapezoid, very thin and flat, sharp edge.	,,	,,	white.	
35	,,	,,	,,	flake, amygdaloid, flattish and thin, very sharp edge.	,,	,,	dull white	
36	,,	,,	,,	flake, sub-oval, flat and thin, sharp edge.	,,	Chert,	blackish.	
37	,,	,,	,,	blade, roughly crescentic; thin, sharp irregular edge.	,,	,,	pinkish.	
38	,,	,,	,,	flake, funnel-shaped, point being very thin and sharp.	,,	Chalcedony,	light red.	

39	,,	,,	Potsherd,	now lost			buff.
40 to 58	,,	,,	Bone splinters,	No. 40 is a tooth, fossilized and Nos. 50–51 partly charred. [No. 56 is a microlith, flake, rectangular narrow, ridged.]			
59	,,	DII 1′–2′	Micro ,	flake, triangular	V. Sm.	Chert,	brownish.
60	,,	,,	,,	flake, roughly semi-circular, cortex on flake; all edges blunt.	Med.	,,	light red.
61	,,	,,	,,	core, amygdaloid, semi-circular section; roughly flaked.	,,	Chalcedony,	light brown.
62	,,	,,	,,	flake, oblong, quite prismatic; bulb and platform;. all edges sharp.	,,	Chert.	flesh.
63	,,	,,	,,	flake scraper, roughly semi-circular, flattish, sharp edge.	,,	,,	brown.
64	,,	,,	,,	flake, quadrantal, flattish; edge on one side.	,,	,,	light red.
65	,,	,,	,,	flake, rectangular; flattish; cortex on face, sharp edge.	Sm.	,,	brownish.
66	,,	,,	,,	flake, roughly amygdaloid, flattish, sharp edge slightly notched at the narrower end.	Med.	Quartz.	
67	,,	,,	Bone splinter,	fossilized, slightly charred; sharp edge on one side; slightly chipped on the back.			
68	,,	,,	Micro,	flake, segment of circle with both ends truncated; ridged, sharp edge.	Sm.	Chert,	purplish.
69	,,	,,	,,	flake, sub-oval, plano-convex sharp edges.	,,	,,	brown.
70	,,	,,	,,	flake, truncated ovoid; ridged, sharp edges.	,,	,,	greyish.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
71	EL/1	DII 1′–2′	Micro,	flake, pointed ovoid; mid-ridge; sharp point and edges.	Sm.	Chert,	mtd. buff.	
72	,,	,,	,,	flake, trapezoid; thin and flattish; sharp edge.	,,	,,	brownish,	
73	,,	,,	,,	flake, sub-oval; thin flattish; face well flaked.	V. Sm.	,,	cream with a black band.	
74	,,	,,	,,	flake, point (?), roughly rhombic, sharp point, (part of a blade).	,,	,,	light red.	
75	,,	,,	,,	flake, point, triangular, thinner at point and butt-end, perhaps for hafting (?)	,,	,,	purplish.	
76	,,	,,	,,	point, triangular, flattish and thin.	,,	,,	pale.	
77	,,	,,	,,	point, amygdaloid, plano-convex.	,,	,,	pinkish.	
78	,,	,,	Potsherd.	thin, smooth red outside, coarse brown inside; wheel-made and well baked.				
79 } 80 }	,,	,,	,,	medium, coarse brown pieces, very porous like brick; sun-baked (?)				
81	,,	,,	,,	Thick, black, smooth on both sides; part of rim; wheel-made; well baked.				
82 } 83 }	,,	,,	,,	Similar to Nos. 79–80.				
84	,,	,,	Bone splinters,					Bone tool.
85	,,	,,		crescentic, worked back; dull edge owing to use, fossilized.				
85a	,,	,,	Bone splinters?	small rectangular piece; fossilized; bevelled edge.				

86	,,	,,	Shells,				
87	,,	,,	,,				
88	,,	,,	Micro,	flake, amygdaloid, prismatic, sharp edge.	Sm.	Chert,	speckly grey.
89	,,	,,	,,	flake, semi-circular with side truncated, prismatic, rough.	Sm.	Quartz,	
90	,,	,,	,,	flake, triangular, prismatic, rough.	V. Sm.	Chert,	pink.
91	,,	D III 2″–3″	Micro,	flake, triangular, prismatic rough,	V. Sm.	Chert,	pink.
92	,,	,,		Torso of a figurine; head (?) and legs broken. 4 slanting incisions on back and neck (?) 1¾ inches × 2¾ inches.		Terracotta	light brown, slightly blackish on base.
93	,,	,,	Potsherd,	thick, smooth red, now silt encrusted; coarse black inside; blackish core; hand-made, imperfectly fired.			
94	,,	,,	Shell,				
95	,,	,,	,,				
96	,,	D IV 3″–4″	Micro,	Now lost.			
97	,,	,,	Shell,	conical.			
98	,,	,,	,,	,,			
99	,,	D V 4″–5″	Micro,	Now lost.			
100	,,	,,	Potsherd,	thick, coarse, dusty; hand-made, and sun baked.			
101 } 102 }	,,	,,	Stone pieces,				
103	,,	,,	Bone splinters,	fossilized.			

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
104 105 106	EL/1	D V 4″–5″	Bone splinters,	charred, fossilized.				
107	,,	D VI 5′–6′	Micro,	flake, scraper (?), secondary chipping on convex side; faceted platform; screw-driver-like point.	Med.	Chert,	cream with darker stains.	
108	,,	,,	,,	flake, quadrantal with one corner incurved, thick; cortexed back; sharped curved edge.	,,	Quartz.		
109	,,	,,	,,	core, amorphous,	,,	Chert,	brownish.	
110	,,	,,	,,	,, ,,	Sm.	,,	purple.	
111	,,	D VI 5′–6′	Micro,	flake, triangular, flattish, sharp edge.	Sm.	Jasper,	purplish red.	
112	,,	,,	,,	discoid, minutely flaked face.	,,	Chert,	mtd. cream.	
113	,,	,,	,,	flake, irregular crescentic; sharp chisel-like edge.	,,	,,	purple.	
114	,,	,,	Potsherd,	Similar to No. 100-(DV).				
115	,,	,,	,,	thick, coarse brown, part of rim; hand-made (?)				
116	,,	,,	Rock,	small piece.		Sandstone,	light brown.	
117	,,	,,	,,	a pebble chip.		Quartzite	,,	
118	,	,,	Bone,	fragment, fossilized.				
119	,,	,,	,,	,, ,,				
120	,,	,,	,,	,, ,,				
121	,,	,,	,,	,, ,,				

122	„	„	„	„ „			
123	„	„	„	„ „ sharp pointed.			
124	„	D VII 6′–7′	Micro,	core (?), roughly cordiform, plano-convex, no edge, heavily covered with carbonate of lime.	Med.	Silicious sandstone.	
125	„	„	„	flake, crescentic; thick cortex back, notched edge.	„	Chert,	brownish.
126	„	„	„	flake, semi-circular, flat, incurved edge.	„	Quartz.	
127	„	„	„	flake, ovoid, steep flaked ridge.	„	Chert,	light grey.
128	„	„	„	flake, crescentic, thick, worked-back; screw-driver-like point.	„	„	dark brown.
129	„	„	„	flake, segment of circle, quadrantal section; no edge, one sharp point.	Sm.	„	brownish.
130	„	„	„	flake; discoid, neatly trimmed face.	„	Quartzite,	purple.
131	„	„	„	flake, eagle beak-shaped, thin and flat, slightly tilted; sharp edge and point.	Sm.	Chert,	brown.
132	„	„	„	flake, scraper, sub-oval; secondary chipping on edge.	„	„	reddish.
133	„	„	Rock,	a rounded piece encrusted with carbonate of lime.		Freestone	brownish.
134 to 150	„	„		Packet containing bone fragments, fossilized.			
151 to 189	„	D VIII 7′–8′		Packet containing bone fragments.			
190	„	„	Bone,	a part of human mandible with two molars, partly fossilized.			

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
191	EL/1	D IX 8′–9′	Bone	fragment.				
192	,,	,,	Kankar.					

EXCAVATED ANTIQUITIES, LANGHNAJ (MOUND II, PIT I)

EL/2 Abbreviation E L/2 = Excavated Antiquities, Langhnaj, Mound II

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
193	EL/2	D I 0′–1′	Micro,	flake, irregular, sector of sphere, curved zigzag edge; very rough.	Med.	Jasper,	chocolate.	
194	,,	,,	,,	flake, ovoid, ridged, blunt edge, rough.	,,	Quartz.		
195	,,	,,	,,	core, rectangular, several flakes removed, leaving a small patch of cortex.	,,	Chert,	reddish.	
196	,,	,,	,,	flake, quadrantal, prismatic section, steep and sharp edge.	,,	,,	light brown.	
197	,,	,,	,,	flake, triangular, prismatic, rough.	,,	,,	buff.	
198	,,	,,	,,	core, irregularly convex polygonal, flaked all over.	Med.	Chert,	purplish.	
199	,,	,,	,,	flake, quadrantal, dull point at one end.	Sm.	,,	brownish.	
200	,,	,,	,,	sub-ovoid, slightly curved, flattish, thick cortex rim, bevelled (?) edge,	Med.	Quartz.		
201	,,	,,	,,	flake, rhombic, sharp side edges.	,,	Chert,	greyish brown.	
202	,,	,,	,,	flake, triangular, thick on one side; notched, sharp side edge.	,,	,,	chocolate.	
203	,,	,,	,,	blade, long rectangular, ridged, tilted body, sharp edges.	,,	,,	mtd. dark brown.	

204	,,	,,	,,	flake, parrot-beak shaped, slightly bent, sharp steep edge.	,,	,,	light brown.
205	,,	,,	,,	blade, rectangular, no edges.	,,	,,	mtd. cream.
206	,,	,,	,,	blade, roughly crescentic, twisted back; sigmoid edge.	Sm.	,,	brownish.
207	,,	,,	,,	blade, triangular, sharp curved edges.	Med.	,,	greyish brown.
208	,,	,,	,,	flake, discoid, flattish; cortex on face; bulb, steep edge around.	,,	,,	buff.
209	,,	,,	,,	flake, semi-oval, thick on one side; sharp sloping, irregular edge.	,,	,,	greyish.
210	,,	,,	,,	flake, scraper, quarter of an oval, sharp curved edge.	,,	,,	cream.
211	,,	,,	,,	flake, obliquely truncated double convex, flattish, scar on face, bulb; sharp side edges.	,,	,,	buff with greyish veins.
212	,,	,,	,,	flake, crescentic, angular; slanting flake scars on face, sharp incurved edge.	,,	,,	cream.
213	,,	,,	,,	flake, quadrantal, plano-convex, sharp edges.	,,	,,	,,
214	,,	,,	,,	flake, triangular, chisel-like edge.	,,	,,	brownish.
215	,,	,,	,,	flake, convex-polygonal, prismatic, sharp irregular edge.	,,	,,	chocolate.
216	,,	,,	,,	flake, quadrantal, thick back; sharp edge.	Sm.	,,	buff.
217	,,	,,	,,	flake, quarter of an oval, thick cortexed back; sharp edge; (part of a long blade).	,,	,,	cream.
218	,,	,,	,,	blade, rectangular, no edge.	,,	Quartz.	
219	,,	,,	,,	blade, crescentic, worked-back, sharp edge.	,,	Chert,	brownish.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
220	$\frac{EL}{2}$	D I 0′–1′	Micro,	flake, semi-circular, thick worked-back, sharp edge.	Med.	Chert,	grey.	
221	,,	,,	,,	flake, quarter of an oval, thick back; erased bulb; irregular edge.	,,	,,	brownish.	
222	,,	,,	,,	flake, L-shaped, flattish; bulb and platform; sharp chisel-shaped edge.	,,	,,	cream.	
223	,,	,,	,,	flake, semi-circular, thick back; sharp edge.	,,	,,	grey.	
224	,,	,,	,,	flake, blade, rectangular. shouldered (?) thin, narrow; mid-ridge; bulb; sharp edges; (part of a longer blade ?)	V. Sm.	,,	brownish.	
225	,,	,,	,,	blade, rectangular, ridged, sharp edges.	,,	,,	chocolate.	
226	,,	,,	,,	blade, rhomboidal, ridged, sharp edges.	,,	,,	light brown.	
227	,,	,,	,,	flake, quadrantal, well trimmed bevelled borders leaving cortex in middle.	,,	Jasper,	red.	
228	,,	,,	,,	flake, discoid, pyramidal well-flaked face and under side.	Sm.	Chert,	reddish with a white side.	
229	,,	,,	,,	flake, point, triangular, sharp edge and point.	,,	,,	brownish.	
230	,,	,,	,,	blade, crescent, pointed, worked-back; sharp edge.	,,	,,	reddish brown.	
231	,,	,,	,,	flake, amygdaloid, prismatic.	,,	,,	greyish.	
232	,,	,,	,,	flake, point, triangular, thick at butt, sharp pointed.	,,	,,	mtd. greyish.	
233	,,	,,	,,	flake, triangular, narrow-ridged, sharp side edges.	,,	,,	brownish.	

234	,,	,,	,,	flake, point, triangular, ridged, sharp point.	,,	Quartz.	
235	,,	,,	,,	flake, equilateral triangular, flattish, no edge.	,,	Chert,	reddish brown.
236	,,	,,	,,	flake, amygdaloid, thin and flat sharp edge.	,,	,,	dark brown.
237	,,	,,	,,	flake, triangular with a truncated corner, thin and flat; slightly prismatic sharp edge.	,,	,,	,,
238	,,	,,	,,	flake, trapezoid, flattish, steep edges.	,,	Agate,	brownish.
239	,,	,,	,,	flake, blade, crescentic, thick backed; narrow blunt edge.	,,	Chert,	,,
240	,,	,,	,,	blade. elongated ovoid, narrow ridge, sharp edges.	,,	,,	red.
241	,,	,,	,,	blade, segment of circle, prismatic, sharp point.	,,	,,	pinkish.
242	,,	,,	,,	flake, point or blade, parrot-beak shaped, sharp point.	,,	,,	buff.
243	,,	,,	,,	angular crescentic; serrated edge and sharp point.	,,	,,	rosy pink.
244	,,	,,	,,	flake, trapezoid, sharp edge.	V. Sm.	,,	brown.
245	,,	,,	,,	flake, blade, crescentic, thick back, sharp used edge.	Sm.	,,	brown.
246	,,	,,	,,	flake, blade, crescentic, thick back; incurved edge.	,,	,,	rosy pink.
247	,,	,,	,,	flake, rhombic in shape and section, well faceted sides, sharp edges.	,,	,,	,,
248	,,	,,	,,	flake, triangular, prismatic, sharp edge.	,,	Quartz.	

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
249	EL/2	D I 0′–1′	Potsherd,	medium, coarse, dull-chocolate, hand-made.				
250	"	"	"	medium, coarse brown, dusty on one side, hand-made.				
251	"	"	"	medium, coarse, blackish; core dusty brown; hand-made.				
252	"	"	"	thick, black, smooth on one side, coarse on the other; part of rim, wheel-made.				
253	"	"	"	Do.				
254	"	"	"	Similar to No. 250, but thinner.				
255	"	"	"	Similar to No. 250.				
256	"	"	"	small lump of haematite coated sand.				
257	"	"	Rock,			Free stone,	brownish.	
258	"	"	"			Sandstone,	pinkish.	
259 to 270	"	"	Bone pieces,	partly fossilized.				
271	"	D II 1′–2′	Rock,	fragment, irregular.		Ironstone,	burnt sienna.	
272	"	"	Micro,	flake, roughly double convex prismatic, unsharp edge, very rough.	Med.	Chert,	purplish grey.	
273	"	"	"	flake, irregular, uneven edge.	"	"	brownish.	
274	"	"	"	flake, roughly plano-convex, quadrantal section; dull edge.	"	Quartz.		

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275	,,	,,	,,	flake (a pebble chip), irregular; no edge, rude.	,,	Chert,	brown.
276	,,	,,	,,	flake, quarter of oval, steep ridge, sharp curved edges.	,,	,,	light grey.
277	,,	,,	,,	flake, sub-ovoid, thin and flat, sharp irregular edge.	Sm.	,,	buff.
278	,,	,,	,,	flake, roughly quadrantal, rude.	,,	,	brownish.
279	,,	,,	,,	flake, trapezoid with two sides concave, plano-convex; the principal side has a fine bevelled edge.	Med.	,	purplish.
280	,,	,,	,,	flake, quarter of oval, flattish; well flaked face; bulb and platform.	,,	,,	brownish.
281	,,	,,	,,	flake, semi-circular, convex edge.	,,	Quartz.	
282	,,	,,	,,	flake, semi-oval, flat, blunt bevelled re-touched edge around the arc.	,,	Chert,	light grey.
283	,,	,,	,,	blade, convex-polygonal, elongated, thick worked-back; sharp edge.	,,	,,	brownish.
284	,,	,,	,,	flake, scraper (?), roughly circular, flaked face; edge not very sharp.	,,	,,	,,
285	,,	,,	,,	flake, point (?); pointed oval; pyramidal; sharp edged sides and point.	,,	,,	light brown.
286	,,	,,	,,	flake, scraper (?), quadrantal, flattish sloping face; sharp edge.	,,	,,	greyish
287	,,	,,	,,	flake, blade, ovoid, flat; bulb; sharp edge on side.	Sm.	,,	brownish.
288	,,	,,	,,	flake, Do.	,,	,,	,,
289	,,	,,	,,	flake, quadrantal, flat, no edge	,,	Crystal.	

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
290	EL/2	D II 1′–2′	Micro;	flake, quadrantal, prismatic, unsharp edge.	Sm.	Chert,	brownish.	
291	,,	,,	,,	flake, scraper (?), amygdaloid; slight thick cortexed back; well flaked flat face; sharp edge.	,,	,,	buff.	
292	,,	,,	,,	flake, crescentic; thick back, edge not very sharp.	,,	Quartz.		
293	,,	,,	,,	flake (pebble chip) quadrantal, blunt edge.	Large,	Sandstone	brownish.	
294	,,	,,	,,	flake, amygdaloid, thin and flattish sloping, flaked face; sharp irregular edge.	,,	Chert,	brown.	
295	,,	,,	,,	flake, point (?) triangular, incurved base; sharp edge and point.	Med.	,,	reddish.	
296	,,	,,	,,	flake, amygdaloid, cortex on one side; rough edge, rude.	,,	,,	greyish.	
297	,,	,,	,,	flake, point, scalene trapezium, no edge, blunt point.	Sm.	Quartz.		
298	,,	,,	,,	flake, point (?) quarter of oval, thick butt, sloping sharp point.	,,	Chert,	brownish.	
299	,,	,,	,,	flake, quadrantal thick back; sharp pointed irregular edge.	,,	,,	greyish brown.	
300	,,	,,	,,	flake, trapezoid in shape and section, parallel flake scar on face; sharp steep edge.	,,	,,	brown	
301	,,	,,	,,	flake, tapering elliptical quadrantal section, sharp edges.	,,	Quartz.		
302	,,	,,	,,	flake, low ridge, sharp edge.	,,	Chert,	brownish.	
303	,,	,,	,,	flake, pointed crescentic; worked-back; sharp edge and point.	,,	,,	,,	

304	,,	,,	,,	flake, oblique truncated ovoid, flake scar by step technique, semi-ridge; sharp edge.	,,	,,	buff.
305	,,	,,	,,	blade, rectangular, slightly thick back; flattish sharp edge.	,,	,,	pink.
306	,,	,,	,,	blade, elongated ovoid; worked-back, sharp edge.	,,	,,	brownish.
307	,,	,,	,,	flake; blade, segment of circle, thick worked-back; sharp edge.	,,	Chalcedony	white
308	,,	,,	,,	flake, rectangular, prismatic, sharp edge.	,,	Chert,	brownish
309	,,	,,	,,	flake, segment of circle, sharp edge and point.	,,	,,	pink
310	,,	,,	,,	flake, trapezoid, unsharp edge.	V. Sm.	,,	light brown
311	,,	,,	,,	flake, scalene triangular, sharp edge.	,,	,,	reddish
312	,,	,,	,,	flake, angular crescentic with thick sides; sharp edge.	,,	,,	purple
313	,,	,,	Potsherd;	thick to medium, coarse, dull brown on both sides; blackish core; hand-made, almost similar to No. 250.			
314	,,	,,	,,	Do.			
315	,,	,,	,,	Do.			
316	,,	,,	,,	medium, smooth on one face; yellowish silty core; hand-made.			
317	,,	,,	,,	thick black; similar to No. 252.			
318	,,	,,	,,	medium, smooth creamy outside, coarse white inside.			
319	,,	,,	,,	Similar to No. 313.			

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
320	EL/2	D II 1'-2'	Potsherd;	thin; smooth, brown red on one face, coarse blackish inside; wheel-made.				
321	,,	,,	,,	Similar to No. 316.				
322	,,	,,	,,	thick to medium, coarse brown, dusty core; hand-made (?).				
323	,,	,,	,,	medium, white crust on thick red wash on both sides; blackish core; hand-made (?).				
324	,,	,,	,,	?				
325 to 329	,,	,,	Bone	pieces in a packet, semi-fossilized.				
330 to 337	,,	,,	,,	Do.				
338 to 341	,,	,,	,,	Charred.				
342 to 350	,,	,,	,,	Do.				
351 to 357	,,	,,	Kankar,	large, nodules in a packet.				See Text, pp. 143-44.
358	,,	D III 2'-3'	Micro:	flake, trapezoid, quadrantal, irregular edge, rude flaking.	Med.	Chert,	reddish brown.	
359	,,	,,	,,	core, irregular, three flake scars.	Sm.	,,	,,	
360	,,	,,	,,	flake, quadrantal, sharp incurved edge.	Med.	,,	greyish.	

361	,,	,,	,,	flake, quadrantal, unsharp edge.	,,	Jasperoid	
362	,,	,,	,,	flake, amygdaloid, flattish, unsharp edge.	,,	Chert, heavily encrusted	chocolate
363	,,	,,	,,	flake, scraper (?), semi-cordiform, plano-convex, incurved sharp, used (?) edge.	,,	Chert,	purplish.
364	,,	,,	,,	flake, amygdaloid with a broken side; thinly but well flaked face; blunt edge.	Large,	,,	,,
365	,,	,,	,,	flake, amygdaloid, flat thick blunt sides.	Med.	Quartz.	
366	,,	,,	,,	flake, scraper (?) sloping face; bulb; sharp irregular edge.	Med.	Chert,	light brown.
367	,,	,,	,,	flake, quadrantal, prismatic, sharp edges.	,,	Chalcedony,	greyish white.
368	,,	,,	,,	flake, amygdaloid, flattish; slightly thick on one side; bulb; sharp edge.	Sm.	Chert,	brownish.
369	,,	,,	,,	flake, rhomboidal, thin and flat; sharp edge.	,,	,,	,,
370	,,	,,	,,	flake, obliquely truncated ovoid; worked-back; sharp edge and point.	,,	Quartz.	
371	,,	,,	,,	flake, blade; rectangular; thin; two-edged.	V. Sm.	Chert,	light red purple.
372	,,	,,	,,	flake, blade; elliptical; sharp edge.	,,	,,	purplish brown.
373	,,	,,	,,	flake, oblong; thin and flat; sharp edges.	,,	agate,	white.
374	,,	,,	,,	flake, triangular cortex on part of face; ridged, sharp point.	Med.	Chert,	purplish grey.
375	,,	,,	,,	flake, triangular, sharp edges and point.	Sm.	,,	grey.
376	,,	,,	,,	flake, semi-oval; well flaked face, bulb; sharp convex edge.	Med.	,,	light red.
377	,,	,,	,,	flake, semi-circular with a sharp projection; cortex on part of face.	,,	,,	brownish.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
378	EL/2	D III 2'-3'	Micro;	flake, triangular, prismatic, sharp steep edge.	Med.	Chert,	brownish.	
379	,,	,,	,,	flake, trapezoid, prismatic, sharp convex edge and broken point.	,,	,,	cream.	
380	,,	,,	,,	flake, irregularly pointed oval.	,,	,,	greyish.	
381	,,	,,	,,	flake, triangular with truncated corners, ridged, sharp convex edge.	,,	,,	flesh.	
382	,,	,,	,,	flake, L-shaped; cortex on part of face, sharp concave edge.	,,	,,	reddish brown.	
383	,,	,,	,,	flake, segment of circle, steep ridge, sharp edge.	Med.	Chert,	purplish.	
384	,,	,,	,,	flake, angular crescentic; thick back; sharp edge.	,,	Quartz.		
385	,,	,,	,,	flake, point (?), triangular with elongated point; one side is slightly indented by vertical flaking (?).	Sm.	Chert,	flesh.	Real Burin (?)
386	,,	,,	,,	flake, semi-crescentic, prismatic, sharp point.	,,	,,	brownish.	
387	,,	,,	,,	flake, segment of circle with a point broken, prismatic.	,,	,,	greyish white.	
388	,,	,,	,,	flake, segment of circle with a point obliquely truncated; worked-back; sharp edge.	V. Sm.	,,	brownish.	
389	,,	,,	,,	flake, point, scalene triangular with a side projection having a sharp point.	,,	,,	chocolate.	
390	,,	,,	,,	flake, point; crescentic with a shorter sharp-edged side and point.	,,	,,	brownish.	

391	,,	,,	,,	flake, point; sub-triangular; thin and flat; sharp edge and point.	,,	,,		
392	,,	,,	,,	flake, elliptical, obliquely truncated end; sharp, sinuous edge.	Med.	Quartz.		
393	,,	,,	,,	flake, blade; double convex; thin flattish cortex on one side; edge sharp but slightly broken.	,,	,,	purplish grey.	
394	,,	,,	,,	flake, blade, irregularly ovoid; mid-ridge, bulb and platform, sharp side edges.	,,	,,	chocolate.	leaf-shaped.
395	,,	,,	,,	flake, amygdaloid, flattish, blunt edge.	,,	,,	,,	
396	,,	,,	,,	flake, sub-oval; thick cortex on one side, sharp steep edge.	,,	,,	light brown.	
397	,,	,,	,,	flake, rhomboidal, prismatic, sharp edges on three sides.	Med.	Chalcedony	yellowish white.	
398	,,	,,	,,	flake, roughly fish-shaped, prismatic short irregular edges.	,,	,,	,,	
399	,,	,,	,,	flake, tapering oval, prismatic, no edges.	Sm.	,,	chocolate.	
400	,,	,,	,,	flake, blade, crescentic, sharp convex edge.	,,	,,	brown.	
401	,,	,,	,,	flake, segment of circle, prismatic, sharp edge and point.	,,	Quartz.		
402	,,	,,	Potsherd;	medium, dull brown, smooth on outside, blackish core and underside; hand-made.				
403	,,	,,	Stone	piece of sandstone.				
404	,,	,,	Potsherd;	Similar to No. 402.				
405	,,	,,	Bones	A bag containing bone fragments.				

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
406 to 412	EL/2	D III 2′–3′		A bag containing bone fragments.				See Text p. 144
413 to 415				Bone tools.				Do.
416 to 421				Charred, fossilized pieces.				
422 to 426				Do				Do.
427	,,	D IV 3′–4′	Micro;	core, irregular and rude, covered with carbonate of lime and silt.	V. large	Chert,	purplish white.	
428	,,	,,	,,	core, irregularly amygdaloid, crude.	Large,	,,	greyish brown.	
429	,,	,,	,,	core, irregularly rectangular, crudely faceted, covered as in No. 427.	,,	quartzite	brownish.	
430	,,	,,	,,	flake, irregularly semi-circular, well-flaked on one face, now encrustated; blunt edge.	Large	Chert,	grey.	
431	,,	,,	,,	flake, convex-polygonal; encrustated, no edge, rude.	,,	,,	mtd. greyish.	
432	,,	,,	,,	flake, convex polygonal; encrustated, no edge, rude.	,,	Quartz,	bluish white.	
433	,,	,,	,,	core-flake; roughly square, face marked by parallel flake scars by 'step' technique; bulb; rough edge.	,,	Chert,	burnt sienna.	

434	,,	,,	,,	flake (pebble chip), roughly sub-oval, plano-convex, irregular edge.	Med.	Jasper,	pale brown.
435	,,	,,	,,	flake, triangular, prismatic, cortex on part of face, sharp edge, rude.	Large	Chert,	pale grey.
436	,,	,,	,,	flake, ovate, cortex on one side, bevelled edge.	Med.	Quartz.	
437	,,	,,	,,	flake, amygdaloid, semi-circular; encrusted on face; no edge, sharp point.	,,	Chert,	dark red.
438	,,	,,	,,	flake, (pebble chip), quadrantal, sharp point.	,,	,,	pale brown.
439	,,	,,	,,	flake, quadrantal; irregular section, no edge, rude.	,,	,,	flesh.
440	,,	,,	,,	flake, trapezoid, oblong section, no edge.	,,	Quartz.	
441	,,	,,	,,	flake, quarter of oval, point and edge on one side.	,,	opaque crystal portion of chalcedony nodule,	white.
442	,,	,,	,,	flake, amygdaloid, prismatic, cortex on butt; sharp edge.	,,	Quartz.	
443	,,	,,	,,	flake, elongated amygdaloid, prismatic, no edge.	,,	,,	white with purplish veins.
444	,,	,,	,,	flake, amygdaloid, thick at butt; sloping and curved point, convex edge.	Med.	Chalcedony,	milky,
445	,,	,,	,,	flake, rectangular, flat, no edge.	,,	Chert,	flesh.
446	,,	,,	,,	flake, scalene triangular, curved body, unsharp edge.	,,	,,	dark grey.
447	,,	,,	,,	flake, semi-oval, quadrantal section, roughly flaked face.	,,	,,	blackish grey.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
448	EL/2	D IV 3′–4′	Micro;	flake, irregularly oblong, uneven and unsharp edge.	Med.	Chert,	greyish white.	
449	,,	,,	,,	flake, flaked face, rectangular; wavy edge.	,,	,,	purplish.	
450	,,	,,	,,	flake, double convex, semi-circular section, blunt edge.	,,	Quartz,	brownish white with dark patches.	
451	,,	,,	,,	flake, quarter of oval; worked thick back; sharp edge.	,,	Cha	cream.	
452	,,	,,	,,	flake, quarter of oval, steep ridge; sharp edges.	,,	Chert,	brownish pale.	
453	,,	,,	,,	flake, quadrantal, no edge, rude.	,,	,,	reddish.	
454	,,	,,	,,	flake, quarter of oval, prismatic, sharp edges.	,,	,,	brownish.	
455	,,	,,	,,	flake, semi-crescentic, trapezoid section, no clear edge.	,,	,,	cream.	
456	,,	,,	,,	flake, rectangular; trapezoid section, thick on one side; sharp steep edge.		Chalcedony,	yellowish.	
457	,,	,,	,,	flake, semi-oval, with hollowed back flattish cortex on part of face; irregular edge; rude.	V. Sm.	Chert,	mtd. buff.	
458	,,	,,	,,	flake, truncated amygdaloid, flattish, rough edge.	Large,	Jasper,	greyish brown.	
459	,,	,,	,,	flake, semi-circular, plano-convex, sharp edge, rude.	,,	,,	purplish grey.	
460	,,	,,	,,	flake, quadrantal, flat; bulb; slightly concave sharp edge.	,,	,,	yellowish grey.	
461	,,	,,	,,	flake, semi-circular; thick at arch, flattish, prominent bulb; irregular sharp edge.	,,	,,	burnt sienna.	

462	,,	,,	,,	flake, trapezoid, flattish; thick cortex on one side; sharp edge.	Med.	,,	mtd. greyish.
463	,,	,,	,,	flake, convex polygonal, prismatic, sharp edge.	Large,	Chert,	brownish.
464	,,	,,	,,	flake, roughly semi-circular, prismatic, sharp edge; encrustated.	Med.	Chalcedony,	"Khakhi"
465	,,	,,	,,	flake, scraper, semi-circular, flattish, parallel flake scar on face; sharp convex edge.	,,	Agate raw sienna with irregular bands	opaque
466	,,	,,	,,	flake, quarter of oval; smooth, plain face and underside; sharp edges.	,,	Cachalong,	pinkish brown.
467	,,	,,	,,	elliptical tectiform (?) front surface, now thickly encrusted on both faces (perhaps originally polished), hence neolith-like.	,,	Earthy haematite.	
468	,,	,,	,,	flake, amygdaloid, plano-convex well flaked face; no edge.	,,	Chalcedony	bluish white.
469	,,	,,	,,	flake, square, pyramidal face, irregular edge; encrusted.	,,	Quartz.	
470	,,	,,	,,	flake, trapezoid, pyramidal, irregular face; uneven edge.	,,	Jasper,	purple.
471	,,	,,	,,	flake, sub-oval, plano-convex, sharp edge; encrusted.	,,	Chert,	blackish purple.
472	,,	,,	,,	flake, semi-circular, parallel flake scar on face; bulb; sharp edges; (part of two edged-blade).	,,	,,	greyish purple.
473	,,	,,	,,	flake, convex, polygonal; parallel flake scar on face; cortex on underside, having a bevelled edge; sharp edge on other side.	Sm.	Jasper,	dark red.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
474	EL 2	D IV 3′-4′	Micro,	blade, segment of circle with an end truncated, other now broken; low mid-ridge, partly chipped away by step flaking; bulb and platform, sharp straight edge on one side; sinuous on the other; encrusted on face.	$1\frac{3}{4}'' \times \frac{5}{8}''$	Chert,	sepia.	
475	,,	,,	,,	blade, triangular, elongated point; sharp steep edge.	Large,	,,	grey.	
476	,,	,,	,,	blade, roughly eagle-beak-shaped; prismatic, rough steep edge.	Med.	,,	chocolate.	
477	,,	,,	,,	blade, angular crescentic; worked-back; somewhat serrated edge; encrusted.	,,	,,	purplish grey	
478	,,	,,	,,	blade, pointed crescentic; plano-convex, smooth and even back with bulb of percussion purposely erased; sharp edge; encrusted.	,,	,,	greyish brown.	
479	,,	,,	,,	blade, pointed crescentic; worked face and back; sharp point and side.	,,	,,	pinkish.	
480	,,	,,	,,	blade, pointed crescentic; thick well-trimmed back; sharp edge and points.	Large,	,,	brownish with pinkish shades	
481	,,	,,	,,	blade, sub-rectangular, flaked ridge; smooth and incurved back, sharp irregular side-edges.	Med.	Chert,	pinkish brown.	
482	,,	,,	,,	blade, quarter of oval, flattish; cortex on part of rim; sharp irregular edge.	,,	Jaspery chert,	buff	
483	,,	,,	,,	blade, quarter of oval, flattish; parallel flake scar on face; thick worked-back; edge sinuous and blunt by use.	,,	Chert,	light grey with pink shades	
484	,,	,,	,,	blade, pointed crescentic, worked-back; sharp edge and point.	,,	Jasper,	chocolate.	

485	,,	,,	,,	flake, segment of circle, flattish uneven face; sharp convex edge.	Med.	Chert,	reddish brown.
486	,,	,,	,,	flake, rectangular, irregular section, sharp edge.	Sm.	,,	purplish grey.
487	,,	,,	,,	flake, segment of circle; rough edge.	,,	Quartz.	
488	,,	,,	,,	flake, segment of circle, worked-back; truncated edge, sinuous and blunt by use.	,,	Chert,	specky purplish.
489	,,	,,	,,	flake, crescentic, worked-back; sharp edge and point.	,,	,,	light grey.
490	,,	,,	,,	flake, segment of circle, thin and flattish; sharp convex edge.	,,	Heliotrope.	
491	,,	,,	,,	blade, sub-rectangular; trapezoid section; no edge, but sharp point.	,,	Quartz.	
492	,,	,,	,,	flake, sub-rectangular, ridged, sharp irregular edge.	,,	Chert,	greyish brown.
493	,,	,,	,,	blade, segment of circle; nail-like, sharp, convex edge.	,,	,,	greyish white.
494	,,	,,	,,	blade, crescentic, worked-back; sharp steep edge.	,,	,,	dull white with brown inclusions.
495	,,	,,	,,	flake, segment of a hollow circle, roughly plano-convex, inner side having a semi-circular notch, back surface appears to be polished as in neoliths; face encrusted.	,,	,,	
496	,,	,,	,,	flake, pointed oval; mostly ridged; face flaked roughly, bulb; encrusted on both faces; blunt edges.	Large,	Earthy haematite,	rusty brown.
497	,,	,,	,,	flake, triangular, flat, all sides precipitous, no edge.	,,	Quartzite,	light purple.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
498	EL 2	D IV 3′-4′	Micro,	flake, sector of circle, plano-convex; sharp edge; encrusted on face.	Med.	Cacholong,	dull, milk white with greyish patches.	
499	,,	,,	,,	flake, double convex, irregular edge.	Med.	Quartz.		
500	,,	,,	,,	point, pointed oval; sharp point; face encrusted.	,,	Chert,	grey with blackish spots.	
501	,,	,,	,,	point, thick at one end, sloping at other; sharp point.	,,	Quartz.		
502	,,	,,	,,	point, roughly triangular sharp steep edge and point.	Sm.	Chert,	chocolate.	
503	,,	,,	,,	sector of circle, irregularly shaped, smooth polished on all sides except one as in neoliths; encrusted.	,,	Haematite,	,,	
504	,,	,,	,,	truncated ovoid, somewhat prismatic, polished on two sides, one side flaked.		,,	,,	
505	,,	,,	,,	flake, discoid, plano-convex, well-trimmed face; bulb and platform.	,,	Sard,	light brown.	
506	,,	,,	,,	flake, pebble chip, trapezoid, flattish, blunt edge.	Med.	Quartzite,	light purple.	
507	,,	,,	,,	flake, obliquely truncated ovoid, plano-convex, well-trimmed face, bulb and platform; sharp irregular edge.	,,	Chert,	red with white shades.	
508	,,	,,	,,	flake, scraper, sub-rectangular, thin and flattish, parallel flaking on face, edge blunt.	,,	,,	brownish pink.	
509	,,	,,	,,	flake, rectangular, thick on one end, sloping on the other; parallel flake scar on face; bulb; two sharp side edges and one edge screw-driver-like or chisel-like.	,,	,,	flesh with dark grey shades.	

510	,,	,,	,,	flake, scraper (?), segment of circle with truncated ends, uneven flaked face; bulb; sharp straight edge.	Med.	,,	orange with greyish shades.
511	,,	,,	,,	flake, irregular, amygdaloid, low mid-ridge; bulb and platform, sharp side-edges.	,,	,,	brownish.
512	,,	,,	,,	blade, oblong, slightly prismatic, sharp edge.	,,	,,	reddish.
513	,,	,,	,,	blade, sub-rectangular; flake scars on face, sharp edge.	,,	Chalcedony,	pale brown.
514	,,	,,	,,	blade, double convex, plano-convex section, sharp edges.	,,	,,	light brown.
515	,,	,,	,,	flake, truncated ovate, flattish, flake scar on face; bulb; sharp edges.	,,	Chert,	chocolate.
516	,,	,,	,,	flake, rhomboidal, low mid-ridge; sharp edge.	,,	,,	greyish.
517	,,	,,	,,	flake, obliquely truncated ovoid, flattish, sharp, serrated-like, edge.	,,	,,	pink.
518	,,	,,	,,	blade, elongated ovoid, obliquely truncated, flattish, blunt edge.	,,	,,	
519	,,	,,	,,	blade, truncated elliptical, thin and flattish, parallel flake scars on face, sharp edges.	Sm.	Chalcedony,	cream.
520	,,	,,	,,	flake, point, amygdaloid; thin and flat, sharp edge and point.	V. Sm.	Chert,	chocolate.
521	,,	,,	Potsherds,	tiny piece of dull brown, smooth-faced, imperfectly fired, hand-made (?) pottery. Similar to Nos. 402, 404.			
522	,,	,,	,,	Do			
523	,,	,,	Rock,	fragment, encrusted.		Quartzite,	purple.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
524	EL/2	D IV 3′–4′	Rock,	fragment encrusted.		Freestone,	white.	
525	,,	,,	,,	fragment.		Freestone,	white.	
526	,,	,,	,,			Quartzite,	rusty brown.	
527	,,	,,	,,	,,		,,	greyish.	
528	,,	,,	,,	,,		Sandstone,	dull brown.	
529	,,	,,	,,	,, nodule.		Chert,	milky white.	
530	,,	,,	,,			Iron-ochre,	dark red.	
531	,,	,,	,,	kankar containing subangular fragments of chalcedony and angularly distributed particles of iron ochre or ore.		Quartzite,	dull light brown.	
532	,,	,,	,,			,,	dull light grey.	
533	,,	,,	,,			Earthy haematite,	dark red.	
534 to 536	,,	,,	,,	Bone splinters.				
537 to 563	,,	,,	,,	,, partly charred.				
564 to 569	,,	,,	,,	,, fossilized.				
570 to 572	,,	,,	,,	Two nails and a tiny skeleton of a lizard-like animal; all fossilized.				
573 to 621	,,	,,	,,	Do small fragments.				

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622 to 629	"	"	"	Do Bone Tools ?				See Text, pp. 144–45.
630	"	"	"	"Cardamom"-like piece. (Not identified; perhaps scales of an armadillo).				
631	"	"		Large bone.				
632	"	"		Tin containing 22 large bones.				
633	"	"		Bag containing bones.				
634	"	"		Shells. "Gastropod."				
635	"	"		" "Helix."				
636	"	"		" fragments of large glossy shell. Lamellibranch–Unio.				
637a	"	D V 4′–5′	Micro,	flake, quadrantal, prismatic, sharp edge; encrusted.	Med.	Quartz.		
638	"	"	"	core, irregularly cone-shaped, rude, encrusted.	"	Quartzite,	purplish.	
639	"	"	"	core, triangular in shape and section, rude.	"	Chert,	milky white.	
640	"	"	"	core, quarter of sphere, rude.	"	"	brownish.	
641	"	"	"	blade, pointed ovoid, curved body; pointed triangular front; back flat and sloping; retouched at butt and side.	"	"	dark brown.	
642	"	"	"	flake, amygdaloid, rough edge; encrusted.	"	Quartzite,	dusty brown.	
643	"	"	"	flake, pointed oval, blunt edge and point.	"	Chert,	greyish.	
644	"	"	"	flake, quadrantal, flattish, no edge.	"	Quartzite,	dust brown.	
645	"	"	"	core, irregularly triangular; flaked on face; rude.	"	Chert,	greyish.	

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
646	EL/2	D V 4′–5′	Micro,	flake, quarter of oval, prismatic, blunt edge, encrusted.	Med.	Quartz.		
647	,,	,,	,,	flake, convex polygonal, no edge, rude.	Sm.	Chert,	brownish.	
648	,,	,,	,,	flake, truncated cone, flattish, rounded edge.	Med.	,,	purple.	
649	,,	,,	,,	flake, discoid, flattish parallel flake scar on face; blunt regular edge; slightly encrusted.	,,	,,	greyish and cream.	
650	,,	,,	,,	flake, worked-back; irregular edge, encrusted.	,,	,,	greyish.	
651	,,	,,	,,	flake, plano-convex, sharp irregular edge.	,,	,,	brownish.	
652	,,	,,	,,	flake, point, irregularly parrot-beak-shaped, sharp edge and pointed; encrusted.	,,	,,	pinkish.	
653	,,	,,	,,	flake, rhombic, slightly prismatic, sharp edge and a projecting point.	,,	,,	yellow.	
654	,,	,,	,,	blade, long, rectangular, thin, ridged, sharp edges.	,,	,,	chocolate.	
655	,,	,	,,	blade, rectangular, thin and flat, ridged (slightly), sharp edges.	,,	,,	brownish.	
656	,,	,,	,,	blade, sub-rectangular, sharp edges and point.	Sm.	,,	reddish.	
657	,,	,,	,,	flake, semi-circular, flattish, sharp edge.	,,	,,	brownish.	
658	,	,,	,,	blade, segment of circle; worked-back; and edge.	,,	Quartz.		
659	,,	,,	,,	blade; elongated ovoid with a notch on one side, sharp irregular edge.	,,	Chert,	brownish.	

660	„	„	„	flake, sector of hollow circle, flattish, parallel flake-scar on face; sharp edge.	„	„		
661	„	„	„	flake, segment of circle, prismatic, sharp edge and point.	„	Quartz.		
662	„	„	„	flake, truncated cone-elongated, flattish, parallel flake-scar on face; sharp edge.	„	Chert,	light brown.	
663	„	„	„	flake, scalene triangular, prismatic sharp curved edges.	„	Carnelian,	white.	
664	„	„	„	flake, segment of circle, prismatic, sharp edge.	V. Sm.	„	light pink.	
665	„	„	„					
666	„	„	Bones,	Bone collection, some fossilized.				
667	„	„		„ Charred,				See Text, p. 145
667A	„	„		„ (Tools ?)				
668	„	„		„ Fossilized.				
669	„	„		„ Tiny bone fragments.				
669A	„	„		„ (Tools ?)				
670	„	„	Shell,	Collection Gastropod.				Do.
671	„	„	„	„ Two large pieces of glossy shell. Lamillibranch Unio.				
672	„	„	„	„ (HELIX.)				
673	„	„	Kankars.					
674	„	D VI 5′-6′	Micro,	flake, quadrantal with a truncated point, plano-convex, sharp edge.	Med.	Cacholong,	cream.	
675	„	„	„	flake, quadrantal, face encrusted; bulb; sharp edge.	„	Chert,	dark grey.	

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
676	EL/2	D VI 5′–6′	Micro,	flake, trapezoid, flat with precipitous sides, no edge, rude.	Med.	Quartz.		
677	,,	,,	,,	flake, parrot-beak-like, ridged, sharp irregular edge.	,,	,,	pinkish.	
678	,,	,,	,,	flake, pointed, amygdaloid, plano convex, sharp edge, point broken.	Sm.	Iron stone (?),	chocolate.	
679	,,	,,	,,	flake, sub-rectangular, plano-convex, sharp edge.	,,	Quartz.		
680	,,	,,	,,	flake, amygdaloid, unsharp edge, rude	,,	Chert,	purplish.	
681	,,	,,	,,	flake, ovate, double-convex, irregular edge.	,,	Quartz.		
682	,,	,,	,,	flake, discoid-like, plano-convex, well trimmed face, sharp edge.	,,	Chert,	dark red.	
683	,,	,,	,,	flake, point, triangular with one point cut off, sharp edge and point.	,,	,,	,,	
684	,,	,,	,,	flake, point, triangular in shape and section, sharp edge and point.	,,	,,	pinkish.	
685	,,	,,	,,	flake, sub-rectangular, sharp edge.	V. Sm.	,,	light brown.	
686	,,	,,	,,	flake, segment of circle with a side truncated; thin and flat, sharp edge.	,,	,,	,,	
687	,,	,,	,,	flake, segment of circle with a side truncated; thin and flat, sharp edge.	V. Sm.	Chert,	chocolate.	
688	,,	,,	,,	flake, convex polygonal, thin and flat, sharp edge.	,,	Carnelian,	dull white.	
689	,,	,,	,,	flake, scalene triangular, thin and flat, sharp edge.	,,	,,	cream.	

690	„	„	„	flake, point, trapezoid, thin and flat, no edge, sharp point.	„	Quartz.		
691	„	„	„	flake, point, truncated, segment of a circle; thin and flat, sharp edge and point.	„	Chert,	pinkish brown.	
692	„	„	Bone,	collection, tiny fragments fossilized.				
693	„	„	„	„ charred pieces.				
694	„	„	„	„ (charred and uncharred).				
695	„	„	„	„ (8 pieces, tools ?).				See Text, p. 145. Most probably of *Tortoise Gan-geticus*
696	„	„	„	„ „ „ "impressed".				
697	„	„	„	„ medium sized, fossilized.				
698	„	„	Shell,	Gastropod.				
699	„	„	Kankar.					
700	„	D VII 6′–7′	Micro,	flake, convex polygonal (5 sides), slightly ridged, sharp edge.	V. Sm.	Chert,	purple.	
701	„	„	„	flake, segment of circle, sharp edge.	„	Quartz.		
702	„	„	„	flake, trapezoid, flat polished, smooth surface; bulb; no edge, but marks as of retouch.	„	Chert,	chocolate.	
703	„	„	„	core (?), amorphous, rude.	„	Cacholong,	white.	
704	„	„	„	flake, sub-triangular, flat, thin, sharp edge.	„	Chalcedony.		
705	„	„	Bone,	pieces.				
706	„	„	Shell,	Helix.				
707	„	„	Kankar.					

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
708	EL/2	D VIII 7′–8′	Micro,	flake, pointed, sub-rectangular, prismatic, sharp point, broken.	Sm.	Quartz.		
709	„	„	„	flake, rectangular, prismatic, sharp edge.	V. Sm.	Chert,	grey.	
710	„	„	„	flake, discoid-like, well-trimmed face; sharp edge.	Sm.	„	purplish red.	
710A	„	„	„	flake, blade, ridged, bulb; two-edged.	„	„	light brown.	
711	„	„	„	flake, rhomboidal, flat, no edge.	„	Quartz.		
712	„	„	„	flake, triangular, sharp edge.	„	Chert,	pinkish brown.	
713	„	„	„	flake, point, triangular, sharp edge and point.	„	Lydian.		
714	„	„	„	flake, point, trapezoid, sharp edge.	„	Chalcedony,	white.	
715	„	„	„	flake, truncated ovate, no edge.	„	Quartz.		
716	„	„	Bone.				lost.	
717	„	D IX 8′–9′	Micro,	flake, roughly trapezoid, flattish irregular edge.	Med.	Chert,	cream.	
718	„	„	„	blade, sub-rectangular, thin and narrow, ridged, sharp edges.	Sm.	„	light grey.	
719	EL II/2	D I 0′–1′	„	flake, trapezoid with a corner projecting; broken, V-shaped edge.	Large,	„	pinkish brown.	
720	„	„	„	flake, trapezoid in shape and section, blunt steep edge, very rude.	„	„	chocolate.	
721	„	„	„	core-like thick flake, parallelogram irregular section, very rude.	„	„	purple.	

722	„	„	„	flake, pebble chip, quadrantal, no edge, rude.	„	Quartzite,	light grey.
723	„	„	„	flake, scraper, truncated amygdaloid, plano-convex, cortex on back; well trimmed face; rough scraping, bevelled edge.	„	Chert,	greyish brown.
724	„	„	„	flake, semi-circular, plano-convex, sharp bevelled edge, rude.	„	„	purplish.
725	„	„	„	flake, rectangular, plano-convex, well-trimmed face; bulb, platform; sharp bevelled edge.	„	„	brownish.
726	„	„	„	flake, scraper, irregularly hexagonal, trapezoid section, sharp edge.	„	Quartzite,	brownish grey.
727	„	„	„	blade (thick pebble chip), rectangular, prismatic, blunted irregular edges on two sides.	„	„	purplish brown.
728	„	„	„	flake, scraper, roughly triangular, steep scraping edge.	Med.	Chert.	brownish grey.
729	„	„	„	flake, (pebble chip) trapezoid, plano-convex, sharp edge.	„	„	reddish.
730	„	„	„	flake, scraper, truncated oval, rough edge.	Large,	Quartz.	
731	„	„	„	flake, semi-circular; thick worked-back; sharp irregular edge.	Med.	Chert,	brownish grey.
732	„	„	„	flake, obliquely truncated ovoid, steep ridge, trimmed face, erased bulb; sharp side-edges.	„	„	dark brown.
733	„	„	„	flake, sub-rectangular, semi-ridged; sharp edge and an awl-like point.	„	„	grey brown.
734	„	„	„	flake, elongated amygdaloid, prismatic, sharp edge.	„	„	dark red.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
735	EL II / 2	D I 0′–1′	Micro,	flake, sub-oval, flattish, trimmed face; blunt edge.	Med.	Chert,	grey.	
736	,,	,,	,,	flake, quadrantal, low pyramidal, trimmed face; blunt irregular edge.	,,	Quartz.		
737	,,	,,	,,	flake, double convex, plano-convex section, bevelled scraping edge.	,,	Chert,	cream.	
738	,,	,,	,,	flake, quarter of oval, steep, sharp-edged ridge, blunt side edges.	,,	,,	brownish white.	
739	,,	,,	,,	core, sub-rectangular, trimmed all round, rude.	,,	,,	reddish brown.	
740	,,	,,	,,	core (?), trapezoid with a corner rounded.	Sm. ,,	,,	light grey.	
741	,,	,,	,,	core (?), trapezoid, trimmed all round, broad edge at one end.	,,	Jasper,	brown.	
742	,,	,,	,,	flake, blade, sector of hollow circle, low ridge, erased bulb, platform; sharp edges.	Med.	Chalcedony,	brownish white.	
743	,,	,,	,,	flake, quarter of oval, low mid-ridge, well-trimmed face, retouched sharp edge.	,,	Cachalong,	ivory.	
744	,,	,,	,,	flake, rectangular, sharp edge.	,,	Chert,	brownish grey.	
745	,,	,,	,,	flake, quarter of oval, worked thick back; flattish, notched edge.	,,	,,	greyish purple.	
746	,,	,,	,,	flake, elongated amygdaloid, low, mid-ridge, sharp edges.	Sm.	Cacholong,	pinkish white.	
747	,,	,,	,,	blade, semi-amygdaloid; partly thick back; sinuous edge.	,,	Chert,	greyish brown.	
748	,,	,,	,,	blade, rectangular, tilted; cortex on one side; sharp edge.	,,	Chalcedony,	brownish white.	

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749	,,	,,	,,	blade, triangular, flat, unsharp edge.	Sm.	Chalcedony,	light red.
750	,,	,,	,,	blade, quarter of oval, slightly ridged, flat, thin, sharp edge.	,,	Chert,	light grey.
751	,,	,,	,,	flake, double convex, ridged, sharp edge,	,,	Quartz.	
752	,,	,,	,,	flake, scalene trapezium, prismatic, little twisted, blunt edge.	,,	Chert,	brownish.
753	,,	,,	,,	flake, segment of circle, prismatic, rough edge.	,,	Quartz.	
754	,,	,,	,,	blade, rectangular, prismatic, sharp edge.	,,	Chert,	reddish brown.
755	,,	,,	,,	flake, double convex, ridged, sharp edge.	,,	,,	purplish.
756	,,	,,	,,	flake, point (?), sub-oval, obliquely truncated, ridged, sharp steep edge, broken point.	,,	,,	purplish brown.
757	,,	,,	,,	flake, lozenge, rough face, good bulb; no clear edge.	,,	,,	dark brown.
758	,,	,,	,,	flake, (point ?), kite-shaped, low mid ridge, very prominent bulb; sharp edges, point broken.	V. Sm.	,,	brown.
759	,,	,,	,,	flake, amygdaloid, semi-ridged, sharp edge.	,,	,,	brown & grey.
760	,,	,,	Pot-sherd;	part of a rim; thick to medium, smooth black on both sides; wheel-made.			
761 to 763	,,	,,	,,	Thick, bright red, now dusty owing to a film of silt, on both sides; not very coarse. No. 761 part of a rim.			
764	,,	,,	,,	Thick, very coarse, black on both sides, hand-made.			
765	,,	,,	,,	Thin, smooth brown on face; smoky core, coarse underside.			

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
766	EL II / 2	D I 0′-1′	Micro,	Thick, coarse bright red on face, dull brown underside.				
767	"	"	"	Same as No. 765.				
768	"	"	"	Medium, bright red on face; very coarse, light brown underside; well baked.				
769	"	"	"	Same as No. 766.				
770	"	"	"	Same as No. 766.				
771	"	"	"	Same as No. 760.				
772	"	"	"	Do				
773	"	"	"	Same as No. 766.				
774	"	"	"	Same as No. 760.				
775	"	"	"	Same as No. 768.				
776	"	"	"	Same as No. 760.				
777	"	"	"	A large, heavy, bright red piece of brick(?).				
778 to 780	"	"	"	A small piece, bright red, very soft, like ochre lumps of ferruginous limonite coated sand.				
781	"	"	Rock,	fragment.	grit.		brownish.	
782	"	"	Bone,	collection 6 fossilized pieces.				
783	"	"	"	collection of fossilized pieces.				

784	,,	,,	,,	pieces, teeth.				See Text, pp. 145–46.
784A	,,	,,	,,	5 pieces, tool-like.				
785	,,	,,	,,	-8 pointed, 1 crescentic, 1 polished } Tool-like.				
786	,,	,,	,,	Small fragments.				
787	,,	,,	,,	Large fragments.				
788	,,	,,	,,					
789	,,	,,	Shell,	collection				
790	,,	,,	Kankar,					
791	,,	D II 1′–2′	Stone,	implement (?), flake (pebble chip).	V. large,	Quartzite,	greyish white.	
792	,,	,,	Micro,	flake, scraper, quadrantal, flattish, cortex on one side; bulb; rough sharp edge.	Large,	Chert,	purple.	
793	,,	,,	,,	flake, pebble chip, blunt edge.	,,	Quartz.		
794	,,	,,	,,	flake, pebble chip, semi-circular with both ends projecting, no edge, sharp point.	Med.	,,		
795	,,	,,	,,	core (?), circular, no edge, all sides blunted and rounded.	Med.	Chert,	reddish brown.	
796	,,	,,	,,	flake, quadrantal, plano-convex, bevelled blunt edge.	,,	,,	greyish brown.	
797	,,	,,	,,	flake, rhomboidal, prismatic, no edge.	,,	Quartzite,	brownish grey.	
798	,,	,,	,,	flake, pebble chip, trapezoid, flattish, rough edge.	,,	,,	brownish white.	
799	,,	,,	,,	flake, scraper, irregularly amygdaloid, thick cortex on arch, flattish, midridge; sharp edge.	Large,	Chert,	buff.	

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
800	EL II / 2	D II 1′–2′	Micro,	flake, semi-circular, no edge.	Med.	Quartz.		
801	,,	,,	,,	flake, pebble chip, sector of circle, flat, sharp edge.	,,	Sard,	light brown.	
802	,,	,,	,,	flake, pebble chip, quadrantal, plano-convex, bevelled edge.	,,	Chert,	chocolate.	
803	,,	,,	,,	flake, sub-rectangular, rough edge.	,,	Quartz.		
804	,,	,,	,,	flake, sub-rectangular, ridged, rough edge	,,	,,		
805	,,	,,	,,	flake, semi-circular, flattish, sharp edge.	Sm.	Chert,	brownish.	
806	,,	,,	,,	flake, segment of circle, rough edge.	Large,	Sandstone,	pinkish brown.	
807	,,	,,	,,	flake, rectangular, flattish, cortex on rim; rough edge.	Med.	Chert,	greyish brown.	
808	,,	,,	,,	flake trapezoid, ridged, sharp edge.	,,	,,	reddish.	
809	,,	,,	,,	flake, double-convex, thin and flattish, sharp irregular edge.	,,	,,	,,	
810	,,	,,	,,	flake, double convex, thin and flattish, parallel flake scar on face; sharp irregular edge.	,,	,,	dark red.	
811	,,	,,	,,	flake, crescentic, no edge, sharp point, rude.	,,	,,	brownish grey.	
812	,,	,,	,,	flake, pointed crescentic; sharp steep edge.	Sm.	,,	brownish.	
813	,,	,,	,,	flake, quarter of oval, ridged, sharp edge.	,,	Quartz.		
814	,,	,,	,,	flake, point, diamond shaped, sharp point.	,,	Chalcedony,	lightly red.	
815	,,	,,	,,	flake, point, triangular with an elongated point.	,,	Chert,	light brown.	

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816	,,	,	,,	flake, triangular, mid-ridge, coarse.	,,	Quartzite,	brownish grey.	
817	,,	,,	Potsherd,	a small piece of medium, black pottery; two parallel incised lines on one face.				
818	,,	,,	,,	a very tiny piece of black ware.				
819	,,	,,	Bone,	collection of fossilized pieces.				
820	,,	,,	,,	,, Tools ? 4 faceted, thin, medium sized. 3 Do 1 tiny pointed.				See Text, pp. 146–47.
821	,,	,,	,,	,, Charred bones, burnt pieces of wood and a tiny clod of cow-dung (?)				
821a	,,	,,	,,					
822	,,	,,	Shell,	collection Helix, Gastropod and Lamilli-branch Unio.				
823	,,	,,	Kankar.					
824	,,	,,	Stone,	artifact, (scraper ?), a pebble chip, roughly quadrantal in shape, double-convex in section; bulbous undersurface, formed by the intersection of upper and lower sloping surfaces, no secondary flaking.	V. large,	Quartzite,	greyish brown.	
825	,,	,,	,,	A nodule of quartz with reddish specks on surface.				
826	,,	,,		scraper (?), semi-circular, pebble chip; sharp irregular edge.	V. large,	Chert,	purplish grey.	
827	,,	,,	Rubber ?,	a pebble piece, roughly square with a naturally bevelled side.		Freestone,	buff.	
828	,,	,,	Stone,	piece.		Sandstone,	red.	
829	,,	,,	Rock,	cemented shingle.			brown.	

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
830	EL II / 2	D II 1′–2′	Rubber?	broken, triangular, very large, similar to No. 827.		Freestone,	pinkish brown.	
831	,,	D III 2′–3′	Heavy stone artefact(?)	core–like, irregular.	V. Large,	Jaspery chert	flesh.	
832	,,	,,	,,	irregularly trapezoid, very rude, no edge, a claw–like point.	,,	Quartzite	light grey.	
833	,,	,,	,,	flaked off from a pebble, quadrantal, no edge, rude.	,,	,,	yellowish brown.	
834	,,	,,	,,	segment of circle, oblong section, no edge.	Large,	,,	light purple.	
835	,,	,,	,,	sector of sphere, no edge.	,,	,,	purplish grey.	
836	,,	,,	Micro,	flake, convex polygonal, irregular edge, very rude.	,,	,,	greyish.	
837	,,	,,	,,	flake, obliquely truncated oval, semi–circular section, flaked all over; blunt edge.	,,	,,	speckled purplish.	
838	,,	,,	,,	core–flake (?), semi circular, plano-convex, roughly flaked all over; irregular edge.	,,	,,	grey with red patches.	
839	,,	,,	,,	uneven pebble nodule, slightly flaked; over face; semi–circular, no edge.	,,	,,	chocolate.	
840	,,	,,	,,	flake, scraper, truncated ovoid, flaked face, sharp edge.	,,	,,	cream.	
841	,,	,,	,,	flake (pebble chip) obliquely truncated oval, plano-convex, sharp irregular edge.	,,	,,	brownish.	
842	,,	,,	,,	flake, scraper, trapezoid, prismatic, rough irregular edge, rude.	,,	Jasper,	chocolate.	

843	,,	,,	,,	flake, scraper, truncated cone-like, slightly pyramidal face; bulb; sharp edge.	,,	Chert,	light grey.
844	,,	,,	,,	flake, pebble chip, amygdaloid, sharp edge.	,,	Quartz.	
845	,,	,,	,,	flake, quadrantal, rough edge.	Med.	,,	
846	,,	,,	,,	flake, semi-cordiform; flaked face; bulb; one point; encrusted.	,,	Chert,	brownish red.
847	,,	,,	,,	flake, sector of hollow circle, blunt edge.	,,	Crystal Quartz.	
848	,,	,,	,,	flake, semi-crescentic, partly flaked face; rough edge.	,,	Chert,	mottled, reddish & buff.
849	,,	,,	,,	flake, quadrantal, flattish, with a step scar.	,,	,,	light grey.
850	,,	,,	,,	flake, oval with a truncated ridge, low pyramidal flaked face, sharp edge.	,,	,,	reddish.
851	,,	,,	,,	flake, trapezoid, short edge.	,,	,,	chocolate.
852	,,	,,	,,	flake, roughly square, mid-ridge prismatic, no clear edge.	,,	,,	cream.
853	,,	,,	,,	flake, amygdaloid, convexo-convex, blunted edge.	,,	,,	greyish brown.
854	,,	,,	,,	flake, ovoid with truncated ends, pyramidal face, sharp irregular edge.	,,	,,	brownish.
855	,,	,,	,,	flake, roughly semi-circular, bevelled edge.	,,	,,	cream.
856	,,	,,	,,	flake, roughly semi-circular, flattish; bulge, sharp sinuous edge.	,,	,,	,,
857	,,	,,	,,	flake, amygdaloid, low mid-ridge; sharp edge.	,,	Iron stone,	dark red.

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
858	EL II / 2	D III 2′-3′	Micro,	flake, trapezoid, flattish, chisel-like edge.	Med.	Chert,	cream.	
859	,,	,,	,,	flake, quadrantal, thick back; rough edge.	,,	,,	purplish.	
860	,,	,,	,,	flake, scalene trapezoid, flattish rough edge.	,,	Quartz.		
861	,,	,,	,,	flake, rectangular, flattish, edge has a concavity, a notch at one end, rude.	,,	Chert,	pinkish.	
862	,,	,,	,,	flake, pebble chip, quadrantal, sharp edge.	,,	,,	brownish.	
863	,,	,,	,,	flake, ovoid, flattish; bulb; rough edge.	,,	,,	dark red.	
854	,,	,,	,,	flake, irregularly semi-circular, parallel flaking on face, sharp even edge.	,,	,,	greyish brown.	
865	,,	,,	,,	flake, scraper (?), amygdaloid, prismatic bulb; sharp edge.	,,	,,	brownish.	
866	,,	,,	,,	blade, scalene trapezium with an incurved side, sharp edge, point broken.	,,	,,	chocolate.	
867	,,	,,	,,	flake, pebble chip, segment of circlē, sharp curved edge.	,,	,,	mtd, buff & purple.	
868	,,	,,	,,	blade, (fine pebble chip), rectangular with rounded ends, plano-convex, worked-back; sharp steep edge.	,,	,,	brownish.	
869	,,	,,	,,	blade, sub-rectangular, semi-ridged, sharp edge.	Sm.	,,	greyish brown.	
870	,,	,,	,,	blade. pointed amygdaloid, oblong section, trimmed point.	,,	,,	,,	
871	,,	,,	Bone,	implement (fossilized), trapezoid, trimmed point, (in a separate packet).				See Text, p. 146

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872	,,	,,	Micro,	flake, rectangular, ridged, sharp rough edge, rude.	,,	Quartz.	
873	,,	,,	,,	flake, segment of circle, worked-back; sharp edge, very shapely.	V. Sm.	Chert,	greyish brown.
874	,,	,,	,,	flake, triangular, blunt edge, rude.	Med.	Quartz.	
875	,,	,,	,,	,, ,, pyramidal, ,,	,,	Chert,	purplish.
876	,,	,,	,,	,, ,, flattish; front ridged; sharp edge and point.	,,	,,	grey.
877	,,	,,	,,	flake, point, triangular, cortex on part of face; bulb; sharp edge and point.	,,	,,	dark red.
878	,,	,,	,,	flake, point, trapezoid, rough edge.	,,	,,	greyish brown.
879	,,	,,	,,	flake, roughly square, plano-convex, sharp irregular edge.	,,	Quartz.	
880	,,	,,	,,	flake, quadrantal, flattish, sharp edge.	,,	,,	
881	,,	,,	,,	flake, wedge-shaped, flattish, sharp incurved edge and point.	Sm.	Chert,	reddish brown.
882	,,	,,	,,	flake, quarter of oval, prismatic, blunt edge.	Med.	Haematite,	reddish purple.
883	,,	,,	Potsherd,	Medium, coarse, blackish, part of a rim.			
884	,,	,,		Thin, smooth bright red on face; dull brown inside, almost similar to No. 768.			
885	,,	,,	,,	Thinner, but otherwise similar to No. 766.			
886							
887	,,	,,	,,	Tiny, thin, coarse, black.			
888 889 890	,,	,,	,,	Small nodules of yellow ochre-like limonite coated sand.			

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
891 } 892 }	EL II / 2	D III 2′–3′	Gravel,	pieces.				
893	,,	,,	Kankar,					
894	,,	,,	Bone,	collection large number of fossilized pieces.				
895	,,	,,	,,	,, pieces, many pointed and faceted pieces.				See Text, p. 147.
896	,,	,,	,,	,, calcined, some like tools (?)				
897	,,	,,	,,	,, flat, thin, long chip, with a central hole.				
897A	,,	,,	Teeth,					
898	,,	,,	Shell,	collection Gastropod and Helix.				
898A	,,	,,		A piece of shining shell (Lamalli branch–Unio).				
899	,,	,,	Kankar.					
900	,,	,,	Lump of Gravel,	(Coarse sand with fine gravel and calcareous cement).				
901	,,	D IV 3′–4′	Micro,					
902	,,	,,	,,	core, irregular, rude.	Med.	Quartz.		
903	,,	,,	,,					
904	,,	,,	,,	flake, roughly quarter of oval, no edge, very rude, encrusted on both sides.	Large,	Haematite,	chocolate.	
905	,,	,,	,,	flake, amygdaloid, partly flaked face; sharp rough edge.	,,	Quartz.		

906	,,	,,	,,	flake, quadrantal, a chip with uneven face.	Med.	Haematite,	chocolate.	
907	,,	,,	,,	flake, trapezoid, mid-ridge, irregular edge.	,,	Chert,	brownish.	
908	,,	,,	,,	flake, semi-cordiform, sharp steep edge and point.	,,	,,	dark red.	
909	,,	,,	,,	flake, crescentic, sharp serrated-like edge.	,,	Quartz.		
910	,,	,,	,,	flake, crescentic angular; with one side elongated; edge has a hollow; broken point.	,,	Chert,	light grey.	
911	,,	,,	,,	flake (chip) ovate, flattish, rough edge.	Sm.	,,	purplish.	
912	,,	,,	,,	flake, quarter of oval, flattish, flake scar on face; sharp edge.	,,	,,	brownish.	
913	,,	,,	,,	flake, rectangular, sharp concave edge.	,,	,,	greyish.	
914	,,	,,	,,	flake, crescentic; thick worked-back; sharp edge and points.	,,	,,	grey.	
915	,,	,,	,,	flake, point (?), triangular, sharp point.	V. Sm.	,,	light brown.	
916	,,	,,	Bones,	fossilized.				See Text, p. 147.
917	,,	,,	,	Tools ? all fossilized. 5 pointed 3 faceted.				
917 A	,,	,,	,,	Tools. all fossilized, some charred in all 8 long pieces.				
918	,,	,,	,,	Fossilized small bone splinters.				
919	,,	,,	Shell,	Lamillibranch Unio.				
920	,,	D V 4′-5′	Stone,	a pebble chip.		Sandstone,	greyish pink.	
921	,,	,,		a piece of chert nodule.		Chert,	purplish.	
922	,,	,,		a fractured piece of quartz.				

Serial No.	Site	Level	Antiquity	Description	Size	Material	Colour	Remarks
923	EL II / 2	D V 4′–5′		a piece of rock.		Freestone,	purplish.	
924	,,	,,	Micro,	flake, trapezoid, high ridge, rough edge.	Large,	Chert,	brownish.	
925	,,	,,	,,	flake, a pebble chip; thickly encrusted on both sides, no edge.	,,	Quartzite,	green.	
926	,,	,,	,,	flake, pebble chip, roughly segment of circle, rough edge, encrusted.	,,	Chert,	purple.	
927	,,	,,	,,	flake, truncated arrow-head like, flattish, no edge.	,,	Quartzite,	brownish.	
928	,,	,,	,,	flake, rectangular, flaked mid-ridge sharp edge.	Med.	Cacholong,	ivory.	
929	,,	,,	,,	flake, amygdaloid, bulb; irregular blunt edge.	Large,	Chert,	brownish grey.	
930	,,	,,	,,	flake, triangular with a broken corner.	,,	Freestone,	purple.	
931	,,	,,	,,	flake, semi-circular, thick worked-back, sharp steep edge.	Med.	Chert,	light red.	
932	,,	,,	,,	flake, quadrantal, semi-circular, section, rough curved edge.	,,	,,	chocolate.	
933	,,	,,	,,	flake, pebble chip, rhomboidal, prismatic, sharp edge.	,,	,,	buff.	
934	,,	,,	,,	flake, semi-circular, flattish, sharp incurved edge.	,,	,,	chocolate.	
935	,,	,,	,,	flake, pebble chip; amygdaloid, flat, unsharp edge.	,,	Quartz.		
936	,,	,,	,,	flake, trapezoid, flattish, flaked face, sharp edges,	,,	Chert,	grey.	

937	,,	,,	,,	flake sub-oval, flattish, rough edge.	Sm.	Chert,	greyish.
938	,,	,,	,,	flake, ovate, flattish, rough edge.	,,	,,	Like a Betel nut core.
939	,,	,,	,,	flake, triangular, sharp point.	,,	,,	grey.
940	,,	,,	,,	flake, segment of circle, worked-back; used (?) sinuous edge.	,,	,,	brownish.
941	,,	,,	,,	flake, point (?), semi-amygdaloid, flattish, sharp point.	,,	,,	pinkish brown.
942	,,	,,	,,	flake, rectangular, mid-ridge; sharp edge.	,,	Quartz.	
9.3	,,	,,	Bone collection: Kankar	two. (one charred ?)			
944	,,	,,					

APPENDIX III

ANALYSIS OF SOIL SAMPLES

BY DR. A. K. DAJI

The author had requested Dr. DAJI to undertake the soil analysis of the samples collected by the Expedition with a view to knowing the general character of the specimens, their mineral constituents, the genetic significance of the sediment and the light it would throw on the palaeo-climatic conditions and palaeo-geography.

For this purpose he wished to know the following details about the specimens:

1 Megascopic appearance.
2 General composition.
3 Mechanical analysis of insoluble residue.
4 Microspic examination.
5 The amount of nitrogen, potash, magnesium and phosphoric acid.
6 Name and probable genesis.

Dr. DAJI's analysis relates to items Nos. 2, 3 and 5 with a short description giving the megascopic appearance of the samples. As regards the probable genesis of the samples they seem, according to him, to belong to the Indo-Gangetic alluvium.

As he had no facilities for carrying out the minerological analysis, item No. 4, viz. the microspic examination has not been done. (This was investigated by Prof. K. V. KELKAR. His report is given in Appendix IV.

Analytical Report of the ten samples of soils collected from the Sabarmati and Orsang Valleys

I Specimen No.	1	2	3	4
Location	Hirpura	Hirpura	Langhnaj	Langhnaj
Field Name	Soil sample, Pit O at 15″ depth	Soil sample Pit O at 72″ depth	Soil sample Mound II Pit I at 36″–48″	Soil sample Mound II Pit I, at 72″
II GENERAL COMPOSITION.				
1 Soluble in cold HCl. ($CaCO_3$)	0·45	3·20	5·45	2·10
2 Insoluble residue	99·55	96·80	94·55	97·90
III MECHANICAL ANALYSIS OF THE WHOLE SAMPLE (BY THE INTERNATIONAL METHOD).				
3 Moisture ...	1·00	0·10	0·20	0·30
4 Coarse sand ...	0·35	2·44	20·44	21·80
5 Fine sand ...	80·95	83·05	62·40	67·30
6 Silt ...	1·50	5·00	4·26	2·25
7 Clay ...	15·75	5·75	7·25	6·25
IV CHEMICAL ANALYSIS OF THE WHOLE SAMPLE.				
8 Lime (CaO) ...	0·36	2·80	·86	1·74
9 Magnesia (MgO) ...	0·27	0·58	0·72	0·83
10 Potash (K_2O) ...	0·19	0·15	0·13	0·10
11 Phosphoric acid (P_2O_5).	0·033	0·098	0·095	0·041
12 Nitrogen ...	0·025	0·012	0·016	0·011

5 Hadol Soil sample Kankar Red Alluvium	6 Warsora Sample of alluvium above conglomerate	7 Taranga Hill Loess sample	8 Bahadarpur Orsang River section near the Kundya nala, Layer II, Sands	9 Bahadarpur Orsang River section near the Kundya nala, Layer III, Fine Alluvium	10 Hirpura Goghadwa Cliff Red loam
1·85	1·35	6·05	2·97	4·30	1·85
98·15	98·65	93·95	97·03	95·70	98·15
0·40	1·10	0·10	2·30	0·90	1·40
17·45	16·90	3·95	19·91	2·05	16·16
58·80	62·90	83·65	66·07	73·00	70·84
2·25	13·00	1·25	2·87	12·50	1·75
19·25	4·75	5·00	5·88	7·25	8·00
1·68	1·23	5·04	2·80	3·67	1·68
0·70	0·74	0·29	0·22	0·64	0·69
0·12	0·15	0·12	0·13	0·12	0·14
0·064	0·047	0·048	0·027	0·033	0·063
0·015	0·018	0·008	0·008	0·014	0·017

V MEGASCOPIC APPEARANCE

Specimen No. 1 :	Dark brown; loose and amorphous fine sand; very slightly gritty.
Specimen No. 2 :	Light brown; loose and amorphous fine sand; very slightly gritty; presence of hard elongated lime concretions.
Specimen No. 3 :	Light buff; loose and amorphous fine sand; slightly gritty.
Specimen No. 4 :	Light brown; loose and amorphous; slightly gritty; presence of a few hard, elongated lime concretions, less than in No. 2.
Specimen No. 5 :	Reddish brown; forming lumps not easy to break; fine material, slightly gritty; big lime concretions, tending to be stalactitic.
Specimen No. 6 :	Light reddish brown; forming lumps more easy to break than in No. 5; very slightly gritty, shining particles of quartz present.
Specimen No. 7 :	Light brown; loose running sand; very slightly gritty; very few lime concretions, small in size.
Specimen No. 8 :	Light brown; forming lumps, easy to break; gritty.
Specimen No. 9 :	Greyish brown; forming rounded lumps, easy to break, occasional hard concretions of lime; slightly gritty.
Specimen No. 10 :	Earthy looking material, with a mixed brickred and ashy grey colour; forming lumps which are broken with a little difficulty; pieces of quartz present.

APPENDIX IV

MINERAL COMPOSITION OF THE SOIL SAMPLES

BY PROFESSOR K. V. KELKAR AND R. B. GUPTE

Of the ten specimens[1] examined, three (viz. Nos. 6, 8 and 9): are river alluvia, and the remaining seven are "loesses". The specimens differ to some extent in their physical characters such as colour, grain size and degree of rounding of the component grains, but their mineral composition is remarkably unifrom. All are composed of almost the same mineral assemblage, the relative proportion of individual minerals alone varying slightly.

Quartz is the principal component of all the specimens. Felspars rank next, and quartz and felspars together make up the bulk of the specimens.

Micas (muscovite and biotite) rank in proportion and occur in all the specimens. They are generally rounded, showing lustrous cleavage plates with oval or circular outlines. Biotite is either fresh or in a decomposed condition.

The minerals mentioned above are the more important constituents. They are more or less stained with yellowish or brownish ferruginous material; most of the latter, however, could be removed by dilute acid. The felspar grains are usually much turbid due to their alteration to clayey material, but about fifty per cent of the grains are clear or sufficiently clear to make their identification possible. The felspar is chiefly microcline; acid plagioclase makes up only a very small part of the total felspar. The specimens contain only a trace of calcium carbonate.

The specimens yield a fair.amount of accessories and residues were extracted from all specimens except No. 1. by means of bromoform: the heavy crop amounted to 4·105% (by weight) in No. 8 (the maximum) and to 0·830% in No. 5 (the minimum). The accessories besides the micas are: hornblende, epidote, garnet, iron ores (magnetite and ilmenite), tourmaline, sphene, kyanite, rutile and zircon. Their relative proportion varies in different specimens, but the order in which they are named is roughly the order of their importance. A colourless fibrous amphibole was noticed in most of the specimens. The accessories obviously have undergone transport and sub-angular, rounded and well rounded forms are exhibited by most of them. Tourmaline shows sub-angular or slightly rounded forms, spherical or egg-shaped grains being as a rule absent. (All of the accessories mentioned above except kyanite were noticed in specimen No. 1 also; the quantity of this specimen was too small to permit extraction of accessories, and kyanite obviously has escaped detection.) A few grains of anatase were found in specimen No. 4.

1 This reference is to the same 10 specimens examined br Dr. Daji and discussed in Appendix III (H. D. S.)

The alluvial material differs from the "loesses" by containing much more of mica and by having much less of rounded grains. The quartz and felsper grains in the alluvium are generally sub-angular. The proportion of rounded and well rounded grains is much higher and that of sub-angular grains much less in the "loesses." The accessories in the "loesses" show, also, a correspondingly higher degree of rounding.

We have not seen the specimens in the field and we can only suggest broadly the origin of these sediments. Our following remarks are based on evidence obtained from a laboratory study of the material supplied to us. The ultimate source of all the sediments is obviously the Archaean rocks in Rajputana; granites, granite-gneisses, mica-schists and other metamorphic rocks in the Aravalli region close to the north and north-east being the initial source of the quartz, felspars, micas and the accessories like garnet, kyanite etc. The alluvial specimens are material carried and deposited by rivers; the "Loesses" are material worked or re-worked by wind. Composition of the specimens needs no comment, and their derivation from the source suggested can be easily explained. A word about Nos. 8, 9 is, however, necessary. These are the only specimen from the south, and from a tract close to the Deccan trap area. These specimen resemble the others closely and the absence in it of the Deccan trap minerals is significant.

APPENDIX V

IDENTIFICATION OF A FEW BONE REMAINS FROM LANGHNAJ

BY

PROFESSOR A. H. KHAN & DR. IRAVATI KARVE

MOUND I, PIT 1.

No. 40 Molar of a goat.
No. 118 A splinter (large) of left os calcis (human).
No. 120 A broken piece of a condyle of metatarsal or metacarpal of goat or calf.
No. 134 Fragment of a skull.
No. 135 Do.
No. 137 Fragment of a metatarsal or metacarpal of the distal extremity of a goat or a calf.
(Number lost) Proximal extremity of the radius of a goat.
No. 142 Transversely cut piece of a long bone.
No. 151 Metacarpal bone of a calf or a goat.
No. 152 Fragment of a long bone–metacarpal or metatarsal of a goat.
No. 154 Fragment from the inferior maxilla of a goat.
No. 155 A piece of dorsal vertebrae (?) of an ox (?), perhaps chipped.
No. 157 Not identifiable, possibly carpal bone of ox (?).
No. 158 Second phalanx of a goat or a calf.
(No. now lost) Fragment of a metacarpal or metatarsal–proximal extremity–of a goat, or distal extremity of a radius (human).
No. 190 Piece of the body of a human mandible-left side piece near the last molar tooth. The 1st and 2nd molars are present. The crowns are worn out; signs of wearing out of the enamel.

MOUND II, LANGHNAJ

No. 405 a Two or three bone ends fossilised together.
No 405 c Radius and ulna, perhaps human, fused together.
No. 495 c–d Tarsal bone–human.
D. 4 *in situ* Incomplete distal extremity of the left metacarpal of big cattle either ox or buffalo ?
No. 788 Molar teeth (goat).
No. 788 b Ear bones (mammal).
No. 814 a Astragalus–a calf or a goat.
No. 819 a Ear bone. (Further identification not possible).
No. 819 b Proximal end of the radius and ulna (?) of a calf.

No. 819 c	Proximal end of the metatarsal bone of a calf.
No. 916	Ear bones (mammal).
No. 916 a	Skull bones–human–temporal (?).
No. 916 f	Molar of a goat.
No. now lost	Distal end of the tibia of a goat.
No. now lost	Ear bone (further identification not possible).

Besides these there are numerous bone splinters but their exact identification is not possible.

(From the foregoing identifications it would appear that at least a part of the fauna of the "microlithic period" consisted of the goat, big cattle like the ox and the buffalo and the cow–that is domesticated animals which even now inhabit the region. A few remains of the human body such as parts of the skull, and pieces of mandible are not sufficient to say definitely about the human types living at that time.)

Specimens of Shells

[The shells found during the excavations of 1941–42 are similar to those found in the excavations at Langhnaj in 1944–45. Samples from the latter were sent to the Director, Zoological Survey of India for identification. Comparing his identifications with the types noted in the Report above (Text and Catalogue), it can now be said, that the following freshwater and terrestrial species of shells are represented by our collection. H. D. S.]

Freshwater

1 *INDOPLANORBIS exustus* (Deshayas).
2 *MELANOIDS* (*melanoids*) *tuberculatus* (Müller).
3 *Lamillibranch Unio.*

Terrestrial

1 *ZOOTECUS insularius* (Ehrenberg).
2 *OPEAS gracile* (Hutton).
3 *PLANISPIRA* (*TRACHIA*) *asperella* (Pfeiffer). } Helix.
4 *MACROCHLAMYS Sp.* }

APPENDIX VI

THE LOESS OF GUJARAT, THE PUNJAB AND EUROPE

From FOOTE's account as well as from our observation of the huge deposits of the so-called loess, and the experience of small diggings at two places, it would appear that these deposits are similar in character, and mode of occurrence to the European, American and Chinese loess described by WRIGHT. It is a fine-grained deposit, consisting of minute particles of quartz, hydrated silicate of alumina, felspar, mica and other minerals, more or less cemented with carbonate of lime, stained yellow with ferruginous matter; there is almost complete absence of any stratification, and vertical cleavages. It also seems to be the product of arid climate, where a dry season alternates with a rainy season, where huge dust storms are common, and there is a large content of calcium carbonate in the soil.

As in China and Europe it is independent of altitude in its distribution. For it thickly covers not only the plains, but has collected in huge deposits at a height varying from the sea level to 1,500 feet in the Taranga Hills.

But in two respects it seems, in our present state of knowledge, to differ from the European and the Punjab (or Potwar) loess recently investigated by De TERRA.

In Europe the loess is related to the glacial deposits, and it has been revealed that the loess occurs thickly all along the border of the glaciated districts on the continent of Europe, both outside and inside the actual limits of the drift. The origin of its component material is not quite clear, but was probably composite, i. e. derived partly from the great deserts and partly from the wind action on the loose material of the drift. But it is emphasised that the loess thickens as it approaches the great river valleys which carried off the glacial outwash, and mantles the outwash terraces themselves in considerable force.

Two kinds of fossil fauna have been found. One is the warm or temperate fauna, indicative of steppe conditions. It includes rodents-jerboa (*Alactaga Jaculus*), the suslih (*Spermophilus rufescenes*), the marmot (*Arctosmys bobac*), the tailess hare (*Lagomys pusillus*) and numerous field mice (*Arvicola gregalis*), such as now live in the eastern steppe districts and remains of the wild horse and of a young *Rhinoceros tichohinus*.

While a few remains, of lemming and other artctic animals, were discovered in the lower beds, constituting the cold fauna. From this evidence it is argued that the climate of the loess was that of a cold steppe, in places so cold that the animals of the Tundra could live in it and in others so dry that burrowing forms like the jerboa were not prevented by ground ice from forming the deep burrows so essential to their existence.

The Punjab or the Potwar loess though similar to that of China in its texture is supposed to be different from it, because it is stratified or coarsely laminated. It usually lies in horizontal layers of light yellow and brown or faintly pinkish strata interchanging with each other. Its texture is uniformly fine, but the mineral grains are so angular as to suggest violent wind transport. No increase in grain size is noticed towards the mountains. There is a scarcity of vertebrate fossils. Of the invertebrate–mollusc and gastropod–freshwater shells were found at one place; elsewhere only land forms were found.

Since petrologically and faunistically the deposit is loessic, but in structure more like that of a lake deposit, De TERRA considers it an eolian deposit, but of the silt from the Soan, Haro, Jhelum and Indus valleys where it is uncemented, caused by dust storms and stratified by air and rain.

The beginning of this dust storm period is placed in the Early Pleistocene, for a developed tool industry comprising blades and scrapers is found in the lower 20 feet of this silt.[1] . The loess itself, it is said, represents the third glacial stage[2] .

On comparing our observations in and of the Gujarat loess with that of Europe and the Potwar described above, two important facts emerge:- namely that the Gujarat "loess," or "terrestrial sand," particularly its upper layers of about 10 feet to 12 feet, might yield a large amount of both invertebrate and vertebrate fauna. The former so far, includes two specimens of Helix, a kind of land shell (gastropod) and three specimens of freshwater shells including the lamallibranch Unio; while the latter includes fossilized remains of the goat, the calf, the ox, the buffalo and an unidentified skeleton of a lizard–like animal, and even a few remains of man (part of a jaw, and fragments of a skull). So far no extinct type of mammalian forms have been found.

Another important fact is that burrowing animals, like field mice, even now inhabit the loess. How far deep they burrow the deposit has not been investigated.

In these two respects the Gujarat loess is similar to the steppe loess of Europe. It also seems to be similar in the origin of its component material, which from a limited survey of the area and examination of its collections, appears to be derived from the deserts to its north–west, and west formed probably by the river silt. Only further, more extensive research would show how far this is true.

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1 De TERRA and PATERSON, *op. cit.*, p.p. 271–75.

2 De TERRA, "Cenozoic cycles in Asia and their Bearing on Human Prehistory", *Procee American Phil. Soc.* 77 (1937), p. 303.

APPENDIX VII

THE KARJAN PALAEOLITHIC INDUSTRY

The Expedition had visited Rajpipla at the end of the season's work, but could not examine the valley of the Karjan river, which flows at a distance of 3 miles to the south of the town. So last year (1942-43) when Mr. R. G. GYANI, Curator of the Prince of Wales Museum went to Rajpipla, Rao Bahadur K. N. DIKSHIT, sent along with him Sadar Din, the Exploration Jamadar who had previously worked with the Expedition. Being an intelligent and experienced worker, he succeeded in finding a number of tools from the left bank of this hitherto unsurveyed river.

The site at Ramgadh

The site, according to him, was at the left bank of the river in almost the left arm of its horse-shoe loop or bend. This location of the site exactly corresponds with the gravel area in the bank, indicated by the 1 inch to a mile map[1]. It is about 2½ miles south-west of the Nandod (Rajpipla) town and hardly two furlongs north-east of the Ramgadh village. Here the river bank is about 40 feet to 50 feet high, of which the upper 20 feet comprise alluvial deposits of various colours, overlying the gravel conglomerate (?). The finds were made at the junction of the alluvial deposits and the gravel. They were found over an area of a furlong.

Finds from Ramgadh

Out of 14 specimens No. 3 seems to be of quartzite, fine grained and slightly stained crimson at one corner; all the rest seem to be of trap. Among the specimens, Nos. 8, 9, and 12, particularly No. 9, appears as if laterite-stained, while others have a dusty grey colour, owing to the contact of black trap with the alluvial silt. Though the sharp edge of tools is slightly broken at places in a few specimens, and there are cracks in some, none of the tools is rolled, in the sense that flake scars become invisible.

The industry comprises (1) pebble tools, (2) hand axes and (3) cleavers on flakes[2].

No. 1 Elongated flat-based pebble, flaked principally from one surface at one end on opposite sides so as to produce a point[3]. The flaking seems to be partly "step". (There is a crack almost at the centre and there are small holes over the flaked surface.)

No. 2 Similar to No. 1, but smaller, and flaked on both surfaces so that the point is narrower, thinner and sharper[3].

1 Survey Map No. 46 G/9 and 13.

2 See Plate XII.

3 Cf. De TERRA and PATERSON, *op. cit.*, p. 305; Early Soan tools from the Indus region. Type (b), iii (pl. xxxv, 7).

No. 3 A flat-based, ovoid pebble, split crosswise. The split surface end perhaps flaked by two large 'step' scars.[4]

No. 4 A large chip from an oval pebble; perhaps a natural fracture.

No. 5 A large rectangular flake, with the edge protruding at one end. The edge is wavy, as if used, but it is difficult to say whether the flake is a tool or merely a fracture.

No. 6 Lancelote-like hand axe; one (upper) surface is fully flaked by deep "step" technique; and slightly near the butt-end, and at times along the edge; otherwise the latter retains the original pebble surface; wavy, sharp edge around, with a thin tapering point.[5]

No. 7 Small oval hand axe; fully flaked on one surface; the edge by small, deep 'step' flaking; the other surface shows a large scar and a few small 'step' scars, along the edge, leaving a small patch of pebble cortex at the butt-end; the edge around wavy and sharp; its secondary trimming by small 'step' scars seems as if made by pressure flaking. (This small hand axe recalls a similar piece No. 230 from Pedhamli I, but the latter appears neater).

No. 8 Small, oval, flat-based hand axe or scraper (?); slightly rolled; under surface is flattish; upper pyramidal; the sides being steep and marked by deep, at places distinct, 'step' scars.

No. 9 Triangular cleaver-on-flake;[6] the flaked surface on one side very slightly – only near the butt-end on one arm-touched; on the other, or underside, most of the surface flaked by deep 'step' flaking; the cleaver edge, slightly convex, now broken by use or battering, is formed by the intersection of the smooth sloping surfaces on either side; whereas the edges on the pointed triangular hand axe-end formed by the intersection of the steeply flaked sides, and the wavy, 'step' flaked underside.

No. 10 Small U-shaped cleaver-on-flake; the underside shows the primary flaked surface, with the bulb erased, and striking platform; no subsequent retouch; the upper side has a small sloping triangular flaked scar, leaving similar cortexed surface on the left arm; the right arm has a few scars; the edge originally straight, but now wavy by use and slight breakage.

No. 11 Small triangular cleaver-cum-hand axe on flake. In shape and technique it closely resembles No. 9. The upper side has a sloping triangular cortexed surface, and steeply flaked borders and point at the hand axe end; the underside is similar; the cleaver edge was perhaps originally straight, but has

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4 Slightly cf. to early Soan tools b, ii (pl. xxxv, 2).

5 Cf. an exactly similar shaped, but more pointed, hand axe from La Micoque, France, MacCurdy, *Human Origins*, Vol. I, p. 120, fig. 47.

6 Cf. De Terra and Paterson on similar cleavers from Attrampakkam, Madras, *op. cit.*, p. 329,; and Krishnaswami, *op. cit.*, pl. 4, No. 2 and 3.

now a concavity at one corner. (The specimen is slightly rolled, and now broken in two but repaired).

No. 12 Small, cleaver-on-flake; convex-ended butt-end and straight, slightly incurved sides; both the surfaces are slightly trimmed, but one – the upper – shows a clear parallelogrammic cross section resembling the Vaal River technique[7] ; the butt-end has a striking platform. The edge originally straight is now wavy by use, and has also a recent tiny breakage.

No. 13 Thick triangular chip, perhaps used as a chopper; pebble cortex on rim; the rest seems to be merely a primary fractured surface, now dusty owing to a thin film of silt.

No. 14 Flat-bottomed disc; most of the under surface retains the pebble cortex, while the upper is conical, fully flaked by 'step' technique; sharp edge around.

Karjan Industry

With the exception of pebble tools Nos. 3, 4, 5, and 13, the rest – the triangular and two small oval hand axes, the three cleavers, one disc and one large pebble tool (chopper ?)—show definite use of 'step' flaking, besides fine forms and more or less regular outline. All the cleavers are on flake, but two of them are Levalloisian in type, having a bulb–erased–and a striking platform; in one, No. 12, part of the surface is flaked by Vaal River technique. The disc too is very well made.

All these tools recall the characteristics in form and technique of the tools from the Attirampakkam Terrace[2] and the Late Acheulean tools from Europe. Hence they may be called "Late Acheulean". In fact the Karjan Industry not only corroborates the conclusion we had arrived at, from the study of the Sabarmati and the Orsang Industries, viz. that a mixed, an Early and Late Acheulean type of industry is found at the junction of the gravel and fine silt, but it provides additional links in its triangular cleavers with the Late Acheulean South Indian industries.[8]

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7 Cf. De TERRA and PATERSON, *op. cit.*, p. 329 and KRISHNASWAMI, *op. cit.*, pl. 4, No. 1.

8 Cleavers No. 9 and 11 resemble the triangular flint cleavers found at Campigny, Seine. Inferieure, reproduced by W. B. WRIGHT, *The Quaternary Ice Age*, p. 297, fig. 100.

APPENDIX VIII

PRESENT LOCATION OF THE COLLECTION

The Collection, excepting potsherds and bones, described in the Report has been at present divided into two equal halves. One half, consisting of the specimens of palaeoliths and microliths mentioned below is with the Baroda Museum; the other half with the Deccan College Postgraduate and Research Institute.

A. Palaeoliths

KOT.	1, 3, 5.
HIRPURA (G).	7, 13, 16, 17, 19, 20, 22, 23, 24, 25, 26, 27, 28, 31, 33, 36, 38, 40, 41, 45, 48, Amazon stone.
PEDHAMLI.	(Gravel) 56, 59, 60, 61, 66a, 68, 79, 96, 114, 125, 130, 179, 184, 193, 195, 196, 201, 206, 220, 230, 235.
PEDHAMLI.	(Junction) 94, 101, 127, 129, 136, 138, 143, 144, 149, 152, 153, 155, 156, 159, 160, 165, 166, 168, 169, 170, 172, 175, 200, 202, 209, 211, 225, 226, 228, 229, 231, 234, 237, 238, 238 (?), 241, 242, 244.
PEDHAMLI.	(Allu.) 53, 64, 69, 72, 74, 75, 76, 81, 87, 88, 90, 97, 98, 100, 102, 106, 108, 110, 115, 116, 121, 122 (?), 124A, 134, 140, 178, 191, 192, 194, 204, 205, 207, 208, 213, 215, 216, 218, 226A, 227, 230. 145, 162, 171, 183, 222.
HADOL.	(Junction) 263.
WASAD.	282.
WARSODA.	243, 245, 246.
SANKHEDA-BAHADARPUR.	287, 290, 291, 293, 295, 298, 300, 301, 302, 304, 305, 306, 307, 312, 316, 318, 320.

B. Microliths

I	Hirpura (Surface finds) 2, 4, 9, 11, 13, 14, 15B, 15C, 16, 17, 20, 21, 22B, 22C, 23, 24, 25, 27, 28, 30, 36, 37, 38, 39, 40, 42A, 42C, 43, 44, 46, 48, 53, one without number. 56, 57, 59, 61. 63, 65, 67, 68, 68A, 69, 71, 75, 76, 77, 77B, 79, 82, 83, 87, 88, 93, 94, 95, 97, 99, 101, 103.
II	Hirpura–Derol (Surface finds) 104, 107, 108, 110, 112, 114, 116, 118, 120, 123, 125, 126, 128, 129, 131, 134, 134B, 134C, 134E, 134F, 134H, 135, 138, 139, 141, 143, 146, 147, 149, 152, 154, 156, 158, 159, 160, 161, 164, 166, 168, 170, 171, 172C, 173, 175, 177, 177B, 177D, 178, 181, 183, 184, 185A, 186, 188, 191, 192, 194, 195, 197, 198, 203, 204,

206. 208, 210A, 210C, 210H, 210F, 210J, 210M, 210P, 210N, 210W, 210, 212, 214, 216, 217, 218, 220, 222, 225, 225A, 225E, 225G, 225I, 225J, 226, 228, 231, 233, 233A, 235, 236, 239, 240, 242, 245, 246, 248, 251, 252, 254, 257, 258, 260, 262, 264A, 264C.

III Pedhamli (Surface finds)

271, 272, 274, 276, 277, 278, 281, 282, 285, 287, 290, 291, 293, 295, 296, 297, 298, 301.

IV Pedhamli–Karoli.

302, 305, 306, 307, 309, 313.

V Pedhamli–Rampura.

315, 316, 317, 320, 322, 324, 326, 329, 332, 335, 337, 338, 342, 343, 346, 347.

VI Mulsan (Surface finds)

348, 350, 351, 355, 357, 358 (?), 360, 367, 369, 370 (?), 372, 380, 383, 385, 386, and three doubtful numbers.

VII Akhaj (Surface finds)

388, 390, 392, 394, 396, 398, 399, 401, 403, 405, 407, 410, 411, 413, 415, 417, 420, 422, 424, 427, 428, 430, 435, 436, 437, 439, 440, 442, 444, 447, 450, 451, 452.

VIII Langhnaj (Surface finds)

295 (?), 251 (?), 445 (?), 456, 457, 458, 461,. 464, 466, 467, 470, 472, 473, 476, 477, 480, 481, 483, 484, 486, 488, 490, 492, 495, 498, 502, 504, 505, 507, 508, 511, 512, 514, 516, 520, 521, 522, 523, 525, 527, 529, 532, 533, 535, 536, 538 (?), 541, 542, 543, 549, 550, 556, 557, 558, 561, 562, 564, 566 (?), 570, 571.

IX Dangarwa (Surface finds)

572, 574, 575, 578, 579, 580, 584, 585, 590, 593, 594, 595, 596, 598, 601, 607, 609, 611, 613, 615, 617, 619, 620, 624, 625, 627, 630, 631, 632(?), 633, 634, 638, 640, 643, 644, 648, 649, 651, 652, 659, 660, 661, 664, 665, 668, 669, 671, 673, 674, 676, 681, 683, 685, 688, 690, 691, 693, 694, 695, 697, 698, 699, 702, 703, 705, 709, 710, 712, 713, 717, 719 720, 723, 745 (645?).

X Wasad Area (Surface finds)

725, 727, 728, 732, 734, 737, 739, 743, 746, 747, 750, 751, 754, 755, 756, 758, 760.

XI Sankheda–Bahadarpur (Surface finds)

761, 764, 766, 769, 770, 772, 773, 774, 776, 778, 781, 783, 785, 788, 790, 792, 793, 794, 796, 798, 799, 802, 803, 806, 810, 812, 813, 814, 815, 817, 824, 826, 827, 829, 830, 832, 834, 837, 838, 841, 844, 847, 848, 850, 852, 855, 856, 859, 860, 861, 863, 865, 867, 869, 871, 875, 879, 880.

XII Excavated Microliths from Hirpura

1, 2, 4, 32, 34, 36, 37, one doubtful. 41 (?), 45, 48, 49, 51, 55, 58, 61, 62, 63, 66, 69, 70, 73, 75, 80, 81, 82, 140, 142, 145, 146, 148, 149, 152, 153, 154, 156, 157, 158, 163, 164, 167, 170, 173, 174,

177, 179, 180, 181, 183, 184, 186, 190, 192, 193, 195, 196, 200, 202, 203, 224, 225, 227, 229, 233, 234, 237, 241, 242, 244, 277, 278, 279, 281, 283, 286, 289, 291, 295, 296, 297, 298, 299, 302, 303, 304, 308, 310, 311, 314, 315, 316, 317, 318, 320, 322, 323, 328, 330, 332, 337, 342, 343, 344, 347, (347) 349, 350, 352, 360, 361, 393, 395, 396, 399, 401, 402, 404, 407, 408, 409, 412, 415, 417, 485, 486, 489, 498, 501, 507, 508, 511, 515, 517, 518, 520, 524 (?), 528, 529, 532, 538, 557, 565, 566, 570, one without number.

XIII Excavated Microliths from Mound I, Langhnaj.
1, 2, 5, 6, 14, 16, 19, 20, 22(?), 23, 27, 30, 31, 32, 37, 38, 40, 41, 42, 43, 46, 55, 56, 59, 60, 61, 64, 65, 68, 70, 72, 75, 88, 109, 124, 125, 126, 129, 130, 132, 133, 138, two without numbers.

XIV Excavated Microliths from Mound II, Langhnaj.
189, 194, 197, 199, 201, 204, 205, 208, 210, 212, 214, 216, 218, 220, 222, 226, 227, 229, 230, 233, 234, 236, 238, 240, 243, 245. 247, 251, 258, 274, 275, 277, 278, 280, 281, 284, 286, 289, 292, 293, 296, 298, 300, 304, 305, 306, 307, 308, 311, 312, 324, 361, 362, 364, 366, 367, 368, 372, 376, 377, 380, 381, 383, 384, 387, 388, 389, 390, 392, 393, 394, 396, 398, 427, 429, 431, 433, 434, 436, 439, 442, 444, 446, 447, 450, 452, 454, 456, 457, 459, 460, 462, 465, 467, 470, 471, 473, 476, 480, 482, 483, 485, 486, 489, 492, 493, 495, 497, 498, 501, 503, 505, 509, 510, 512, 513, 515, 516, 518, 520, 523, 524, 525, 526, 527, 538, 602, 637, 639, 640, 644, 646, 650, 651, 653, 654, 656, 658, 660, 675, 676, 679, 380, 684, 685, 687, 690, 700, 703, 710, 711, 717, 720, 722, 723, 725(?), 727, 729, 730, 732, 734, 736, 739, 741, 742, 743, 745, 747, 749, 751, 755, 757, 792, 795, 798, 799, 800, 803, 806, 807, 808, 809, 812, 813, 824, 826, 827, 828, 831, 833, 835, 837 (?), 838, 840, 842, 845, 847, 850, 851, 854, 856, 857, 860, 861, 862, 865 (?), 866, 867, 869, 872, 873, 876, 877, 879, 904, 905, 906, 908, 910, 920, 922, 923, 925, 926, 927, 928, 933, 934, 935, 936, 939, six doubtful numbers.

XV Dangarwa etc.
582, 592, 759.

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CORRIGENDA

P. 6	Line 10 from above,	for	"submetamorphie"	*read*	"submetamorphic."
P. 16	Line 17 from below,	for	"Pobble Tool"	*read*	"Pebble Tool."
P. 44	Line 3 from above,	for	"Biuce FOOTE"	*read*	"Bruce FOOTE."
P. 44	Line 5 from above,	for	"Palaeo-ontological"	*read*	"Palaeontological."
P. 85		for	"Ch. II. Pt. II"	*read*	"Ch. III. Pt. II."
P. 131	Line 14 from above,	for	"Keniya"	*read*	"Kenya."
P. 139	Line 25 and 26 from above,	for	"Bramagiri"	*read*	"Brahmagiri."
P. 142	Line 14 from above,	for	"Magdelenian"	*read*	"Magdalenian."
P. 142	Line 21 from above,	for	"Magalmose"	*read*	"Maglemose."
P. 148	Line 17 from above,	for	"Bambuta"	*read*	"Bambata."
P. 149	Line 18 from above,	for the sentence	"the microlithic evidence is not sufficient"	*read*	"the microlithic evidence is neither sufficient."
PP. 234, 236, 238, 240, 244 under the second column on site,		for	"H"	*read*	"EH."

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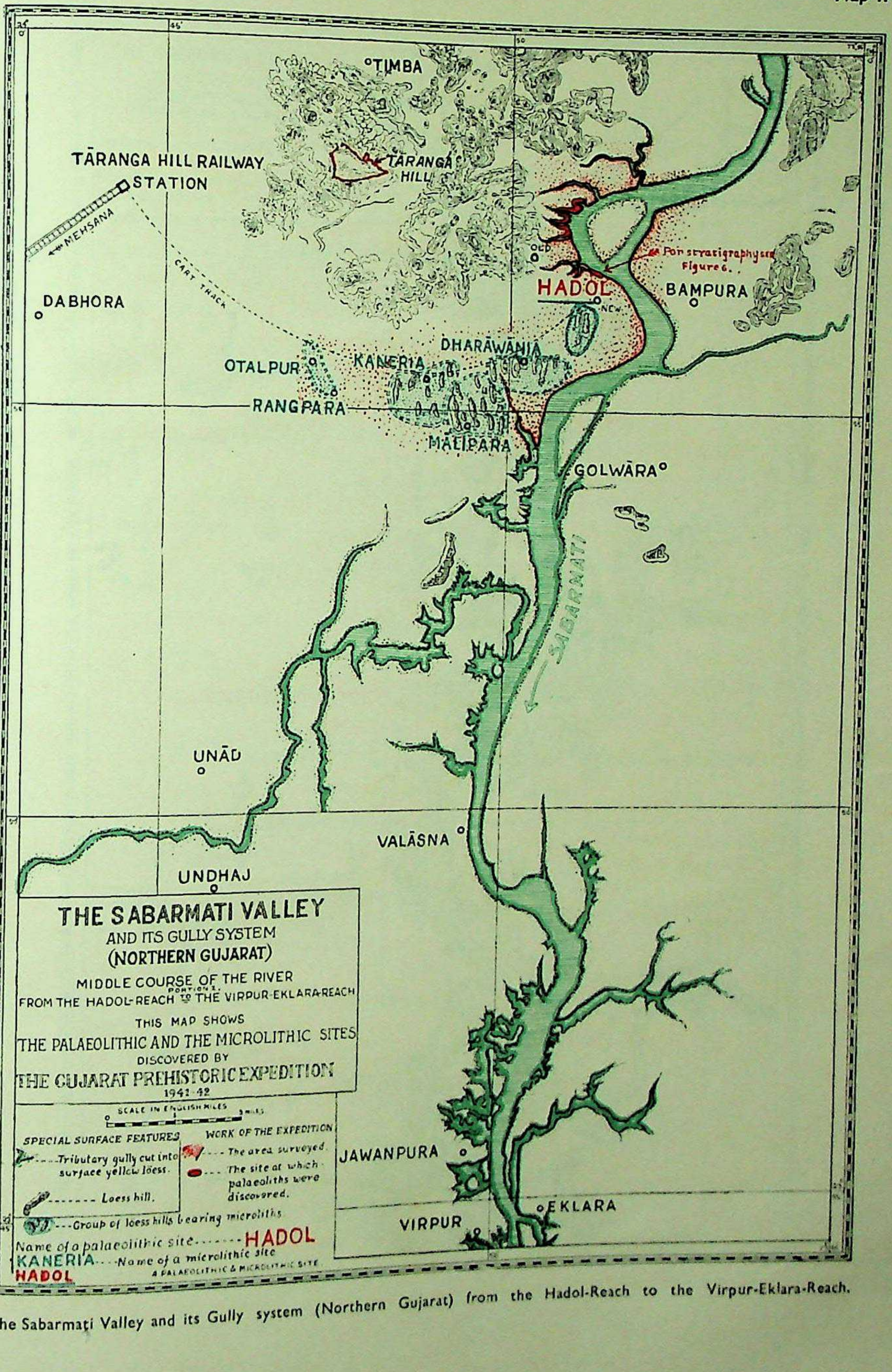

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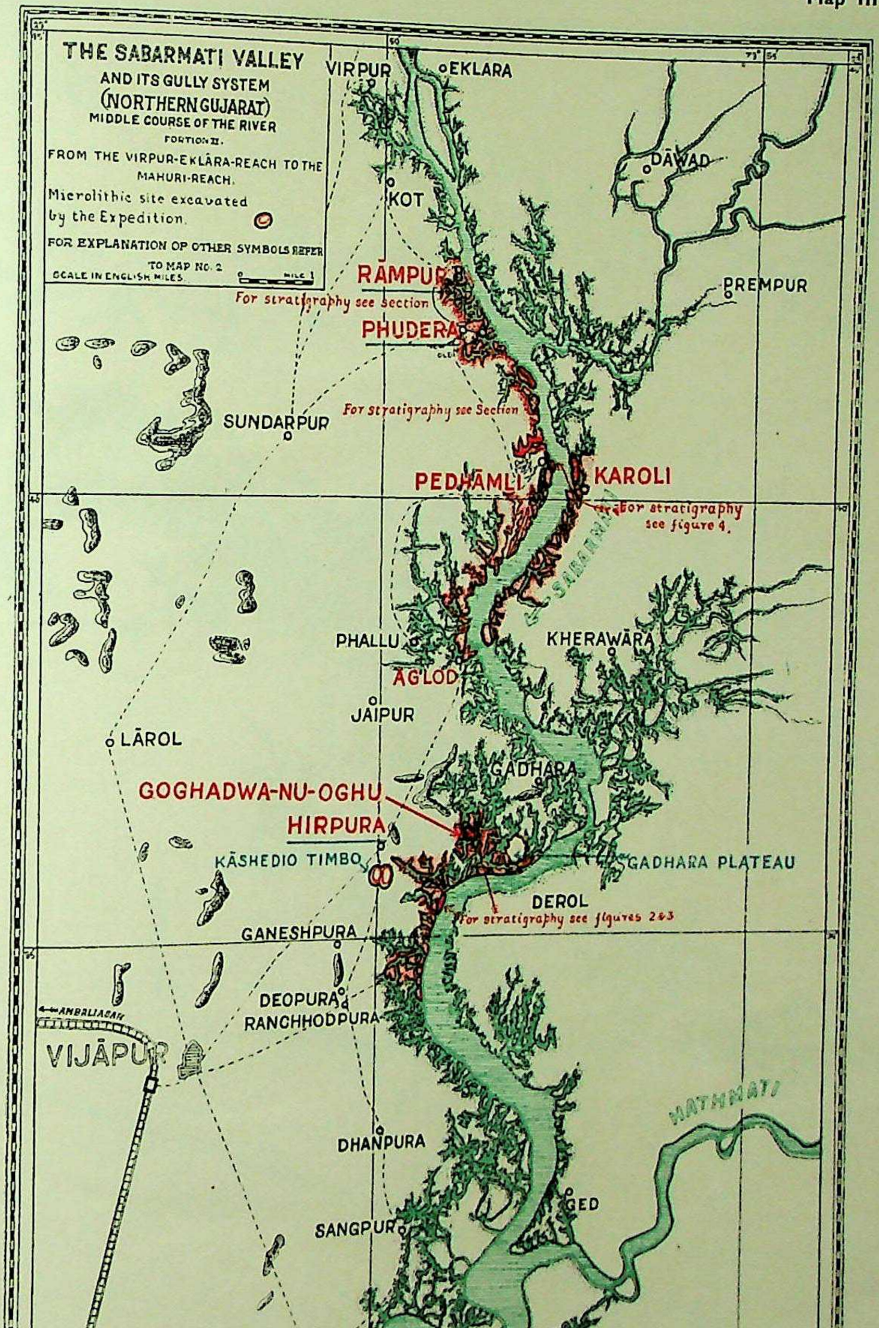
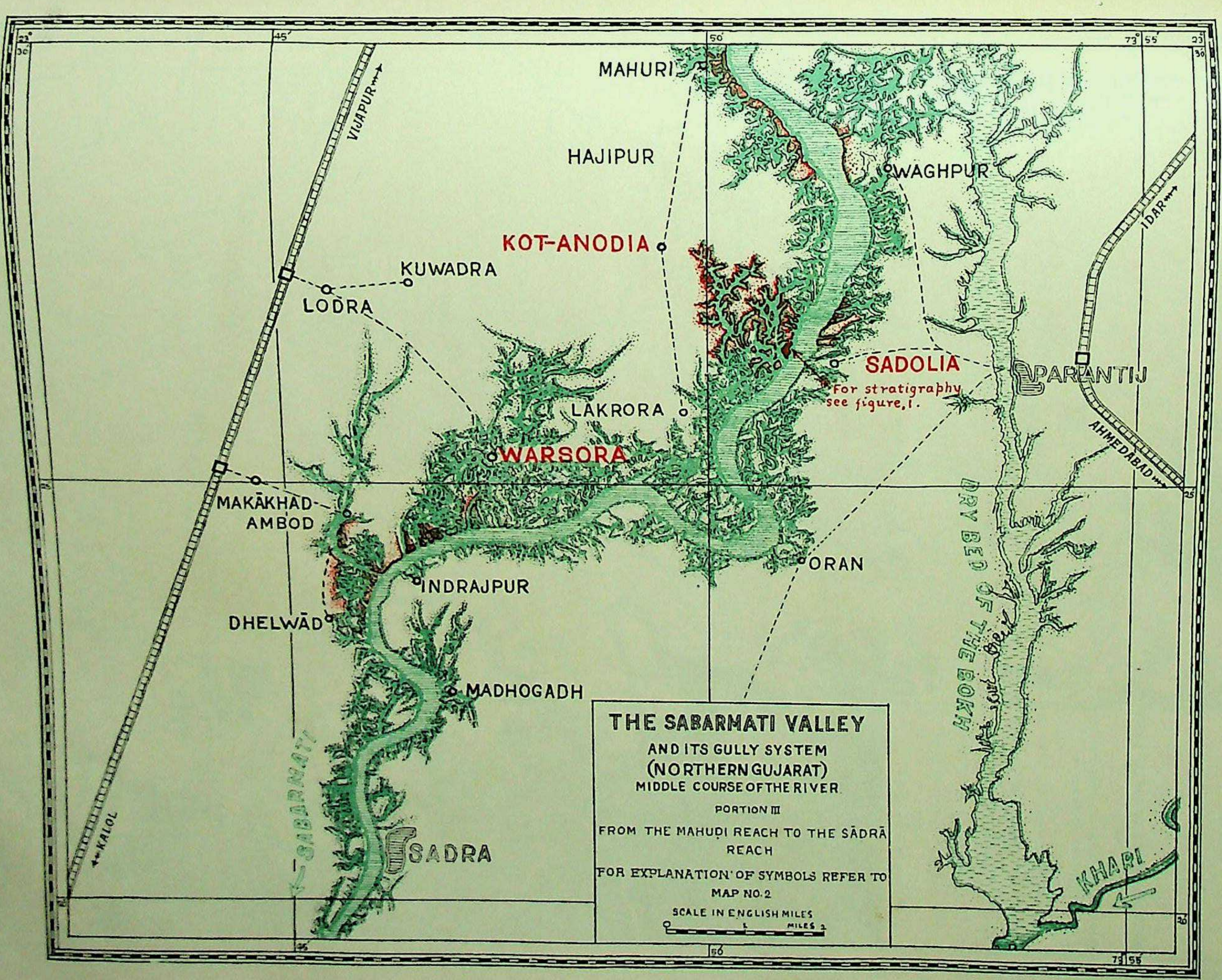


From the Virpur-Reach to the Mahuri-Reach.



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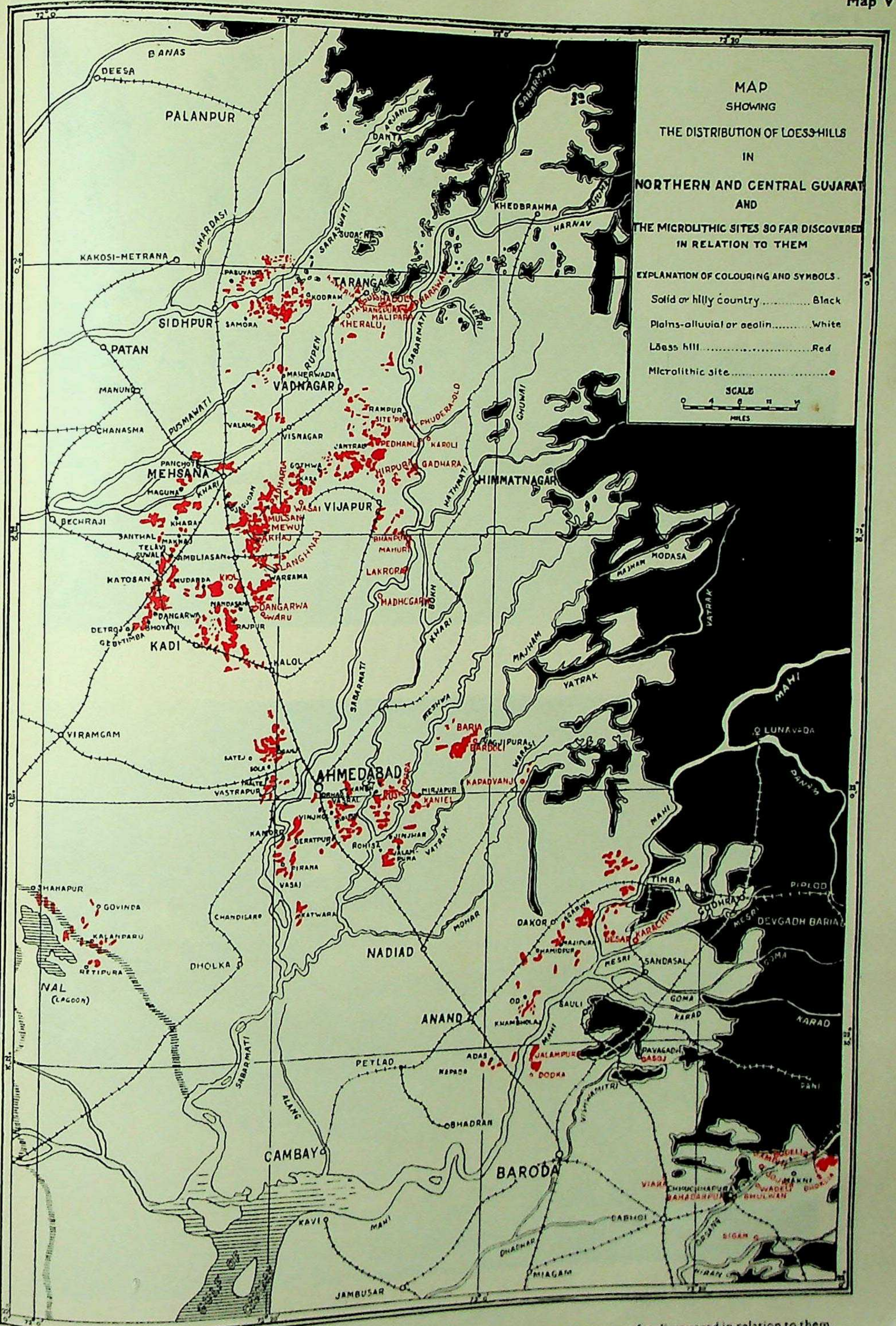


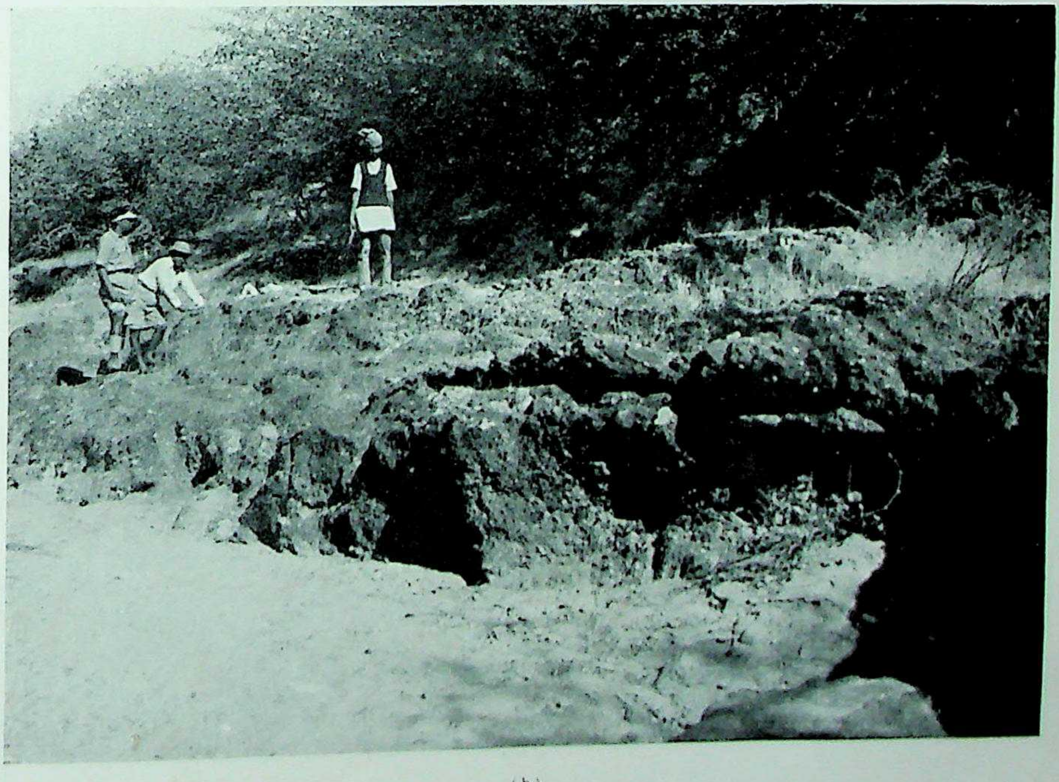
...thern and Central Gujarat and the microlithic sites so far discovered in relation to them.

(a)

(b)

(a) Right bank of the Sabarmati, HIRPURA.
(b) Weathered gravel stratum, GHADHARA NALA.

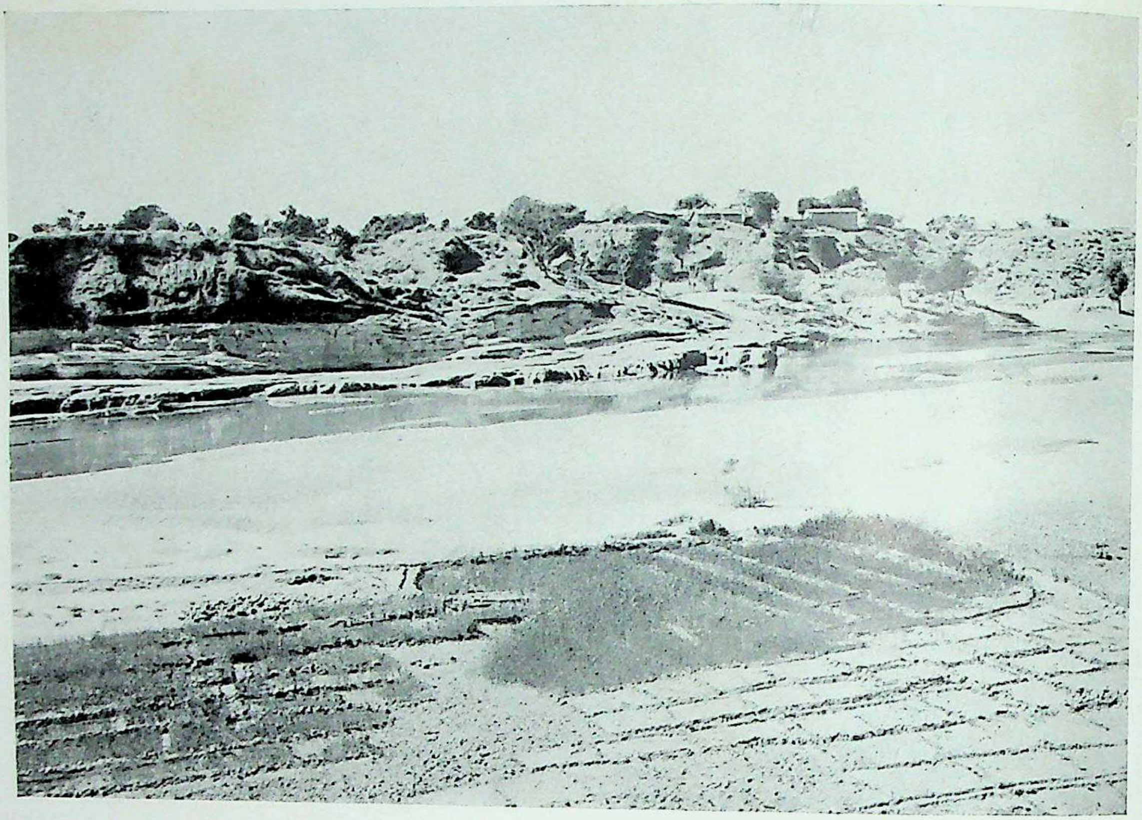
(a)



(b)

(a) Right bank of the Sabarmati, HIRPURA.

(b) Weathered gravel stratum, GHADHARA NALA.



(a)

(b)

(a) Right bank of the Sabarmati near the Shiva Temple, PEDHAMLI.

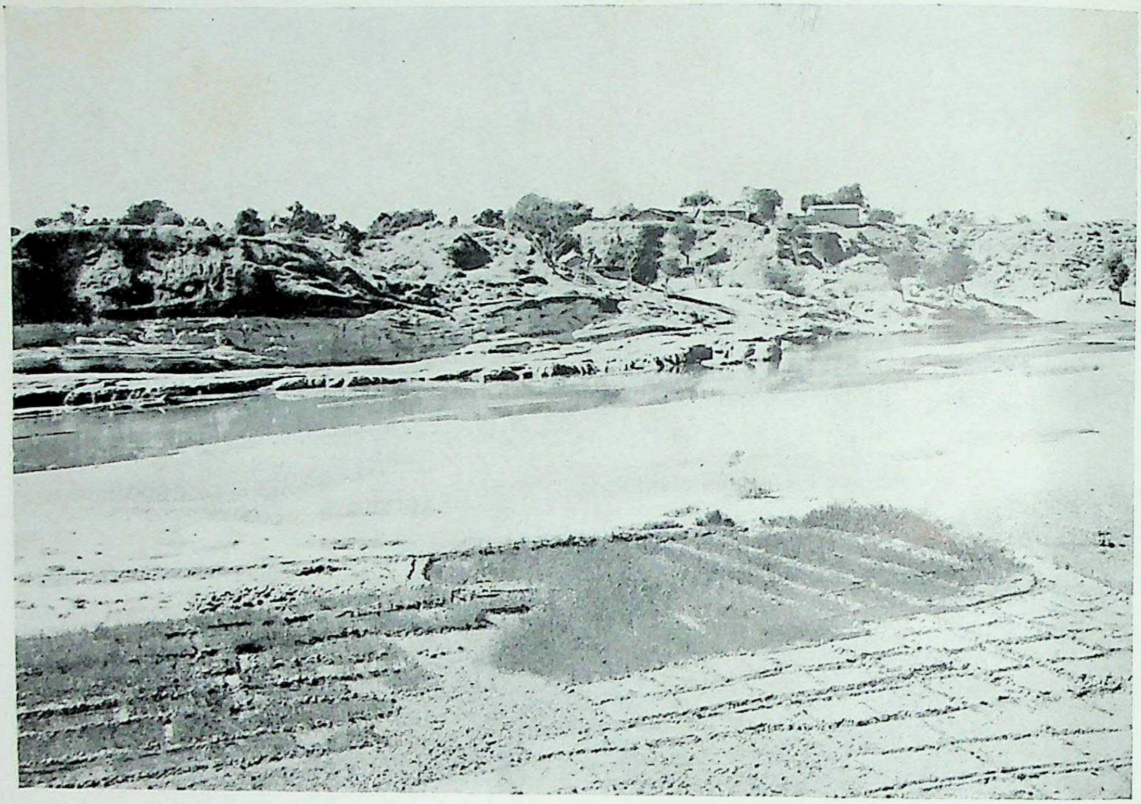
(b) Left bank of the Sabarmati

(a)

(b)

(a) Right bank of the Sabarmati near JUNA NALA, HADOL.

(b) Extracting a hand axe from the gravel stratum near JUNA NALA, HADOL.

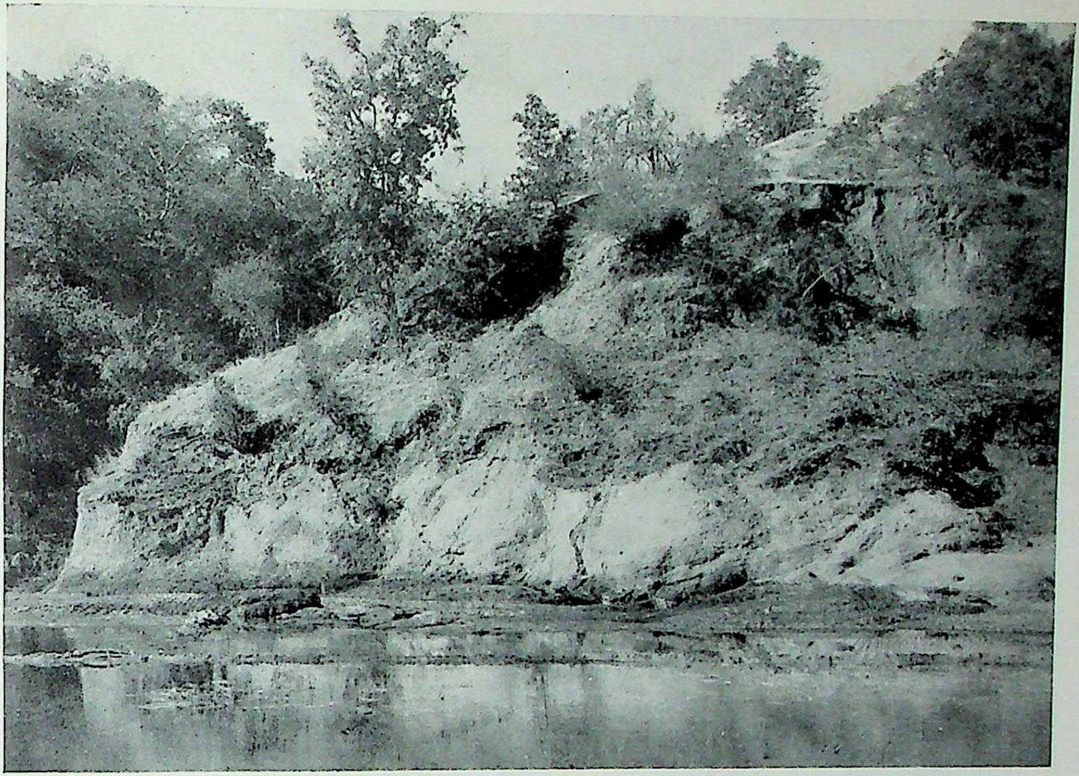


(a)

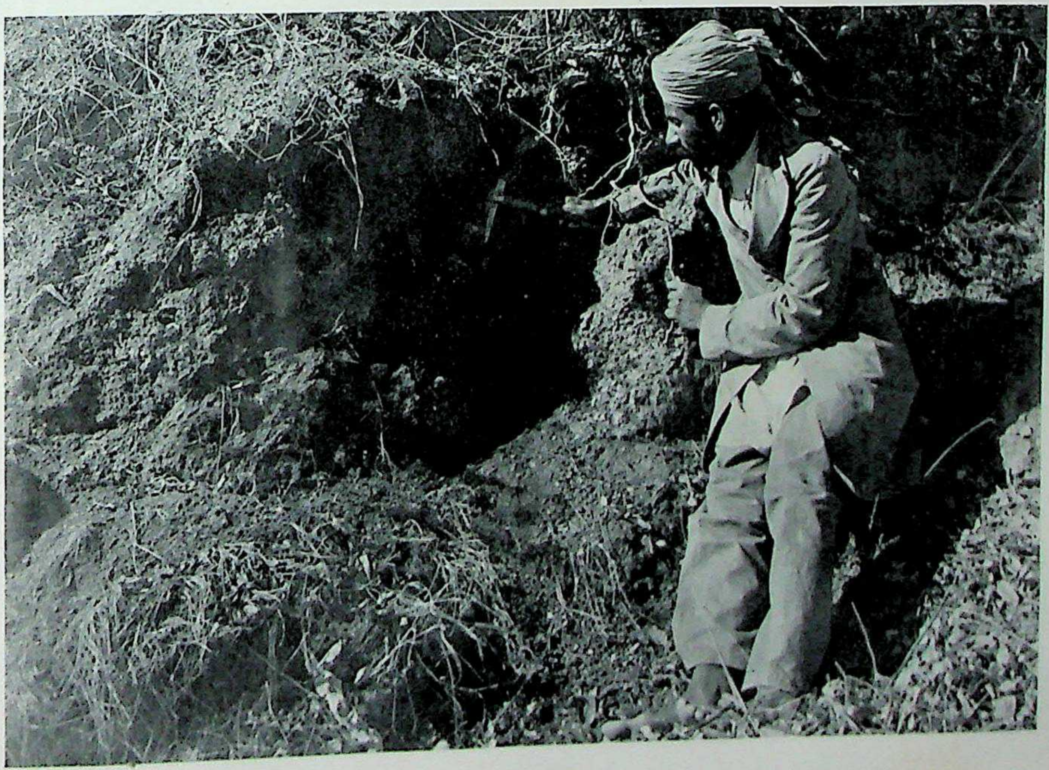
(b)

(a) Right bank of the Sabarmati near the Shiva Temple, PEDHAMLI.

(b) Left bank of the Sabarmati opposite the Shiva Temple, KAROLI.



(a)

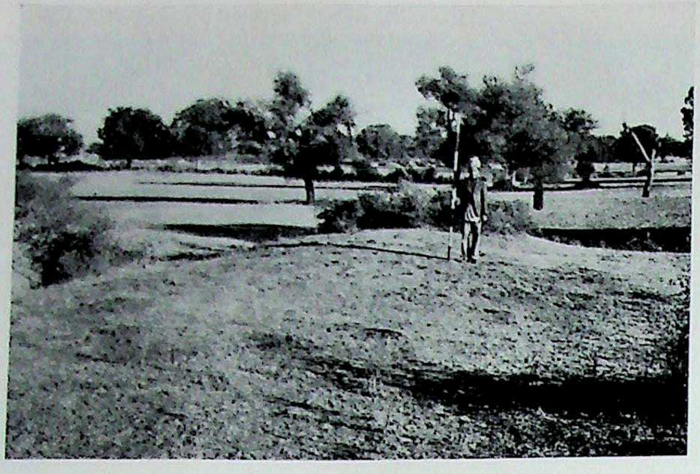


(b)

(a) Right bank of the Sabarmati near JUNA NALA, HADOL.

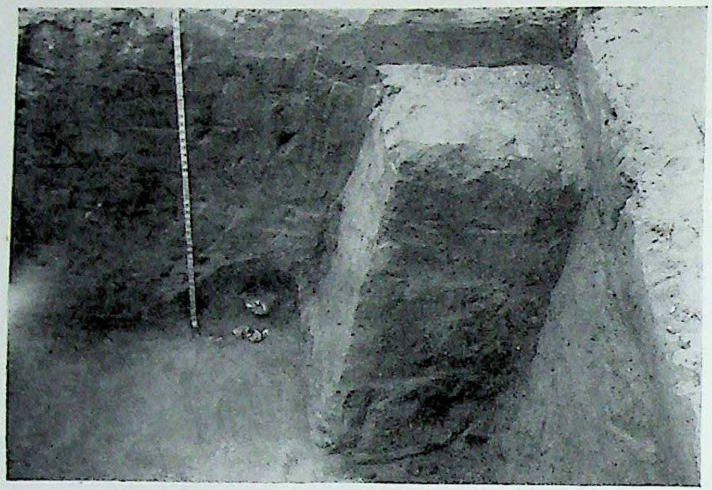
(b) Extracting a hand axe from the gravel stratum near JUNA NALA, HADOL.

Plate IV



(a)

(b)

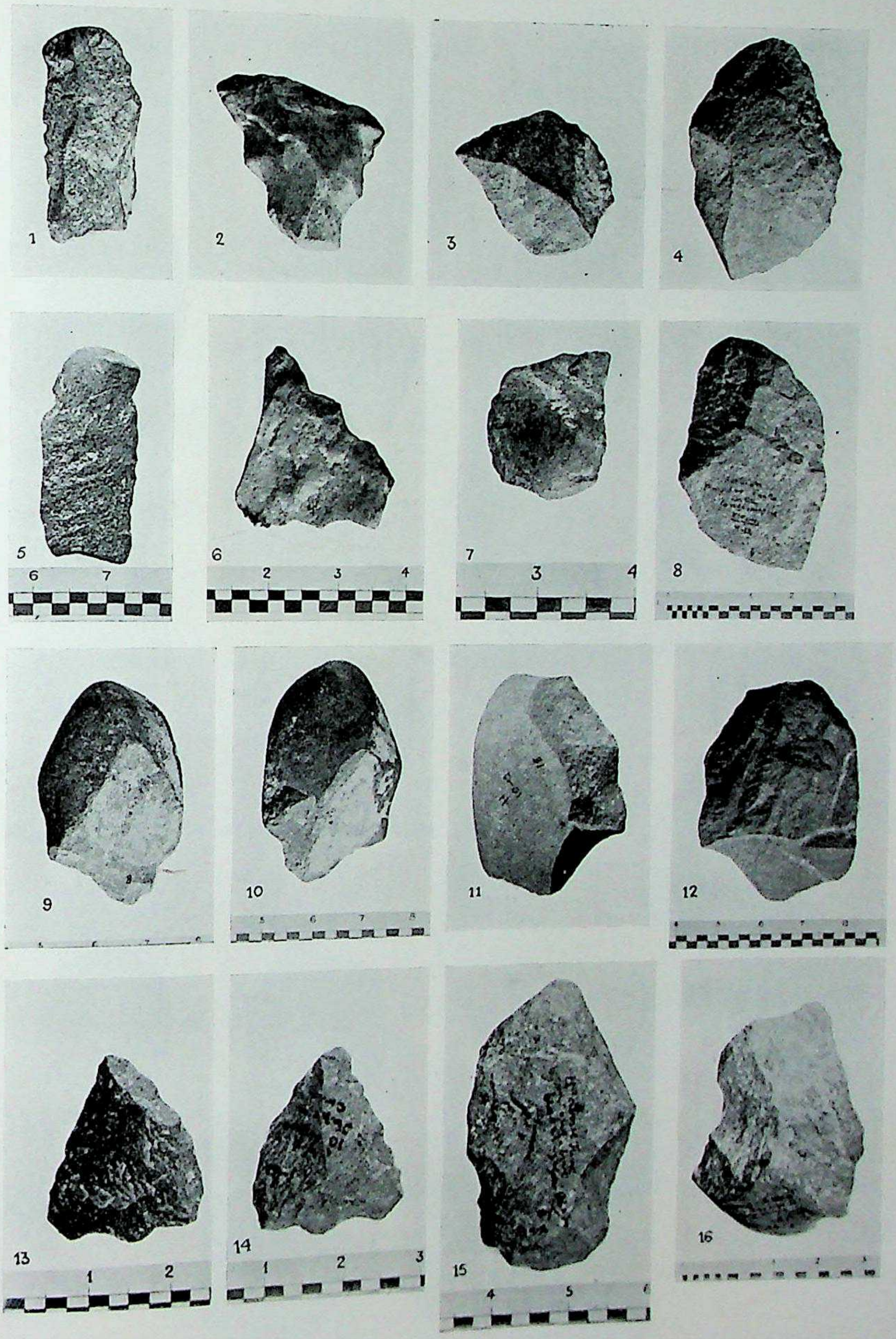


(c)

(d)

(a) Rat-hole end of the Kashedio Timbo (mound), HIRPURA, before excavation.
(b) The ' inundation ' lake at LANGHANJ with microlithic hillocks to its north-west.
(c) Pit I, Mound II, LANGHANJ with a large fossilized bone (long bone of a mammal) *in situ*.
(d) Loess deposits on the TARANGA HILL.

Plate V

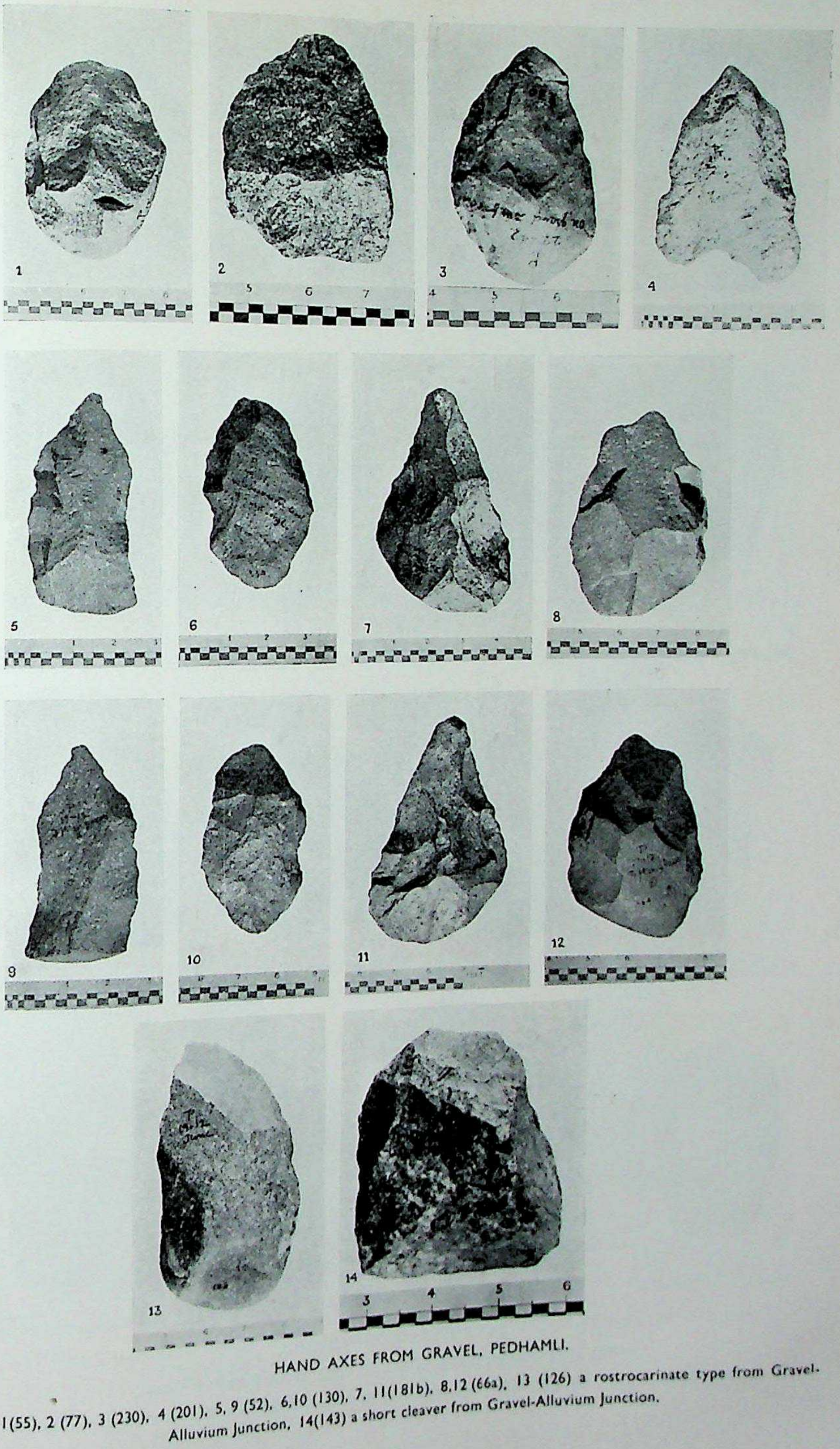


1, 5 (1), 2, 6(4) flakes from KOT, 3, 7 (7), 4, 8 (6) flake and cleaver-cum-hand axe from HIRPURA, 9, 12 pebble tools from HIRPURA, 13-14 (245), 15 (243), 16 (244a) flake and hand axes from WARSORA.

HAND AXES FROM GHADHARA.

1, 5 (25), 2, 6 (28), 3, 7(37), 4, 8 (30), 9 (27), 10 (32), 11(35), 12 (38).

Plate VII

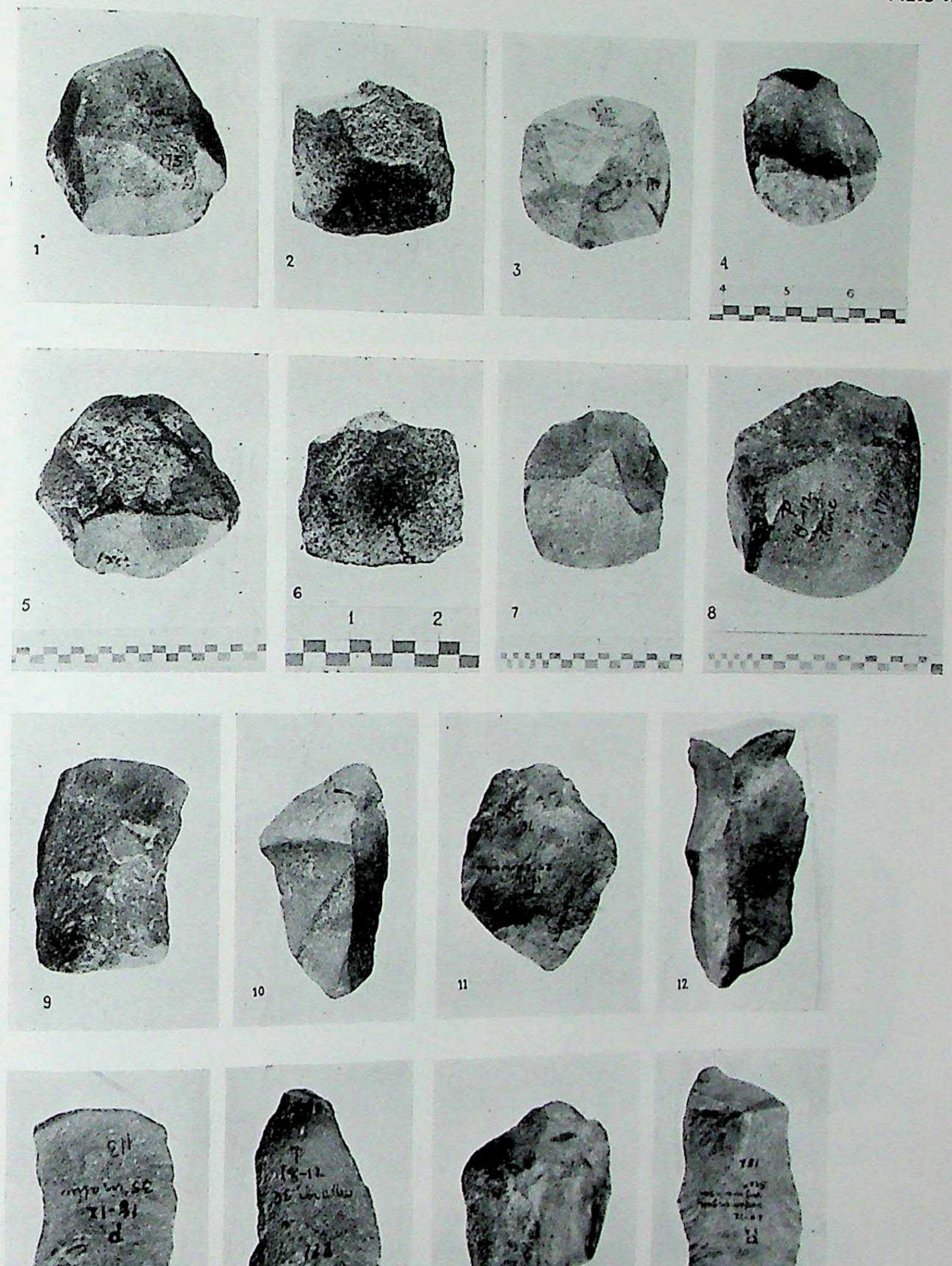


HAND AXES FROM GRAVEL, PEDHAMLI.

1 (55), 2 (77), 3 (230), 4 (201), 5, 9 (52), 6, 10 (130), 7, 11 (181b), 8, 12 (66a), 13 (126) a rostrocarinate type from Gravel-Alluvium Junction, 14 (143) a short cleaver from Gravel-Alluvium Junction.

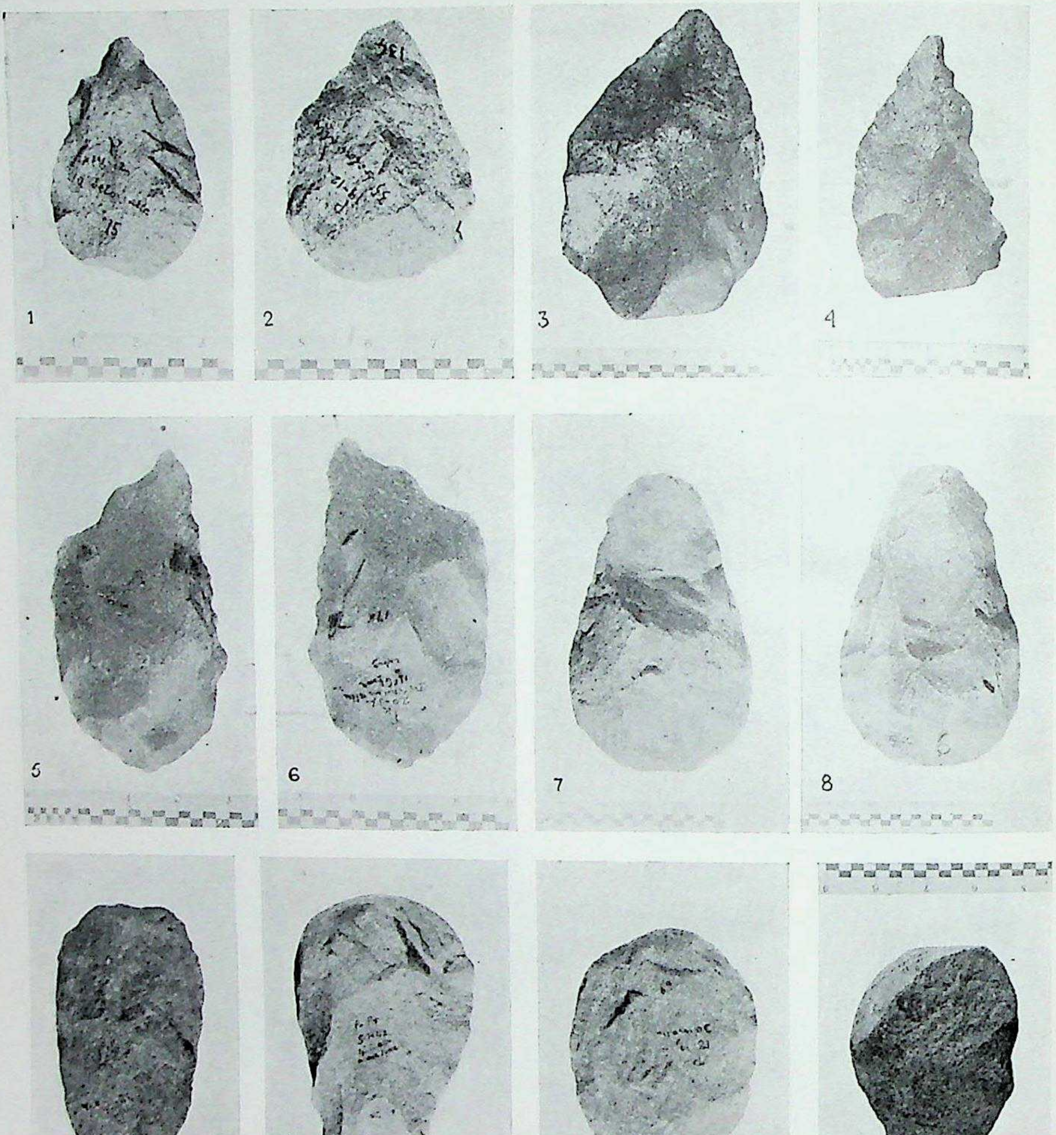
IMPLEMENTS FROM PEDHAMLI.

1(195), 2(58) cleavers, 3(210), 6(60) core, 4(68), 5(147) flake from Gravel,
7(226a), 8(132), 9(131), 10(129), 16(85) hand axes from Junction, 13(224), 14,15(74) cleavers from Alluvium.



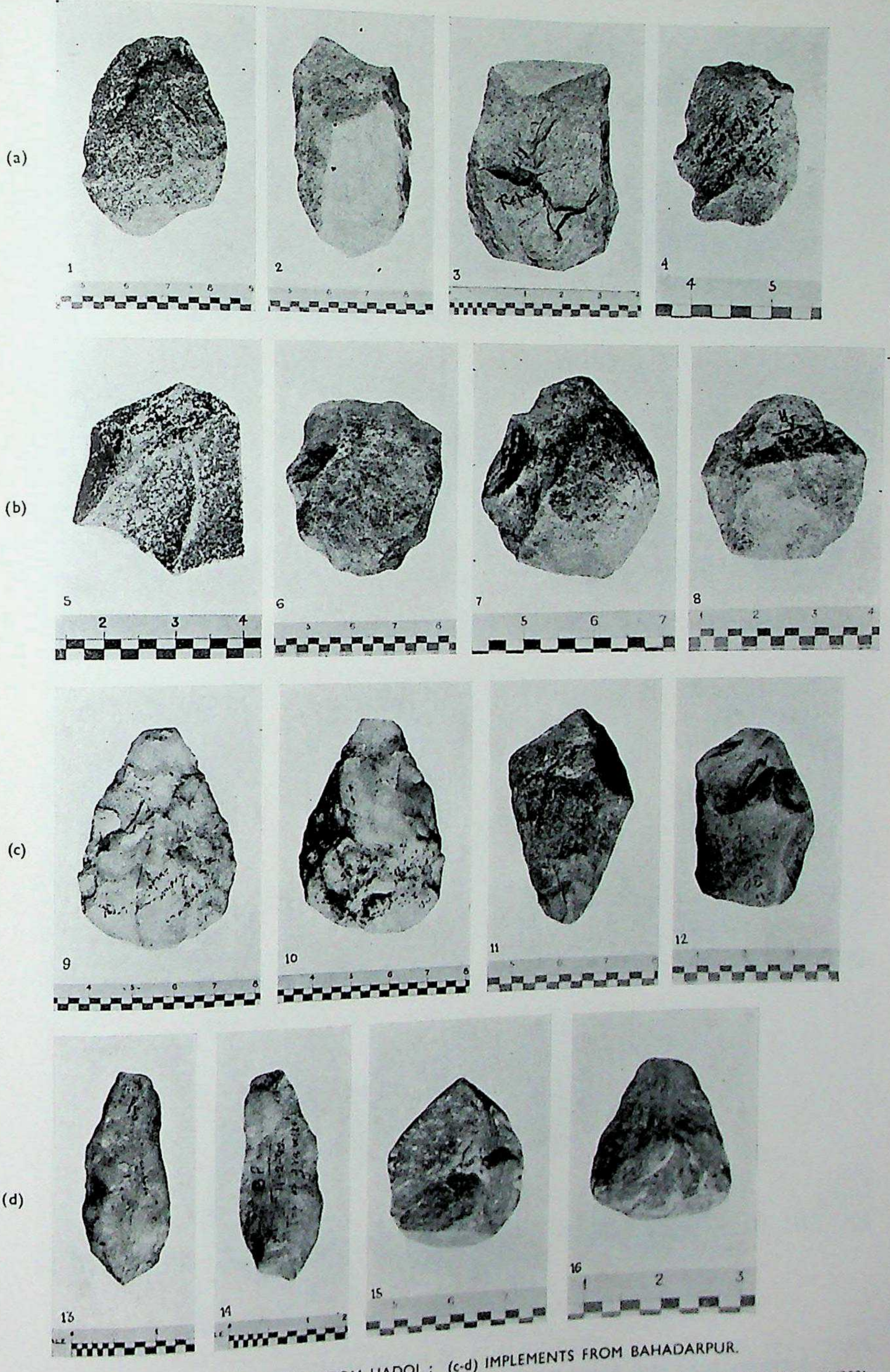
IMPLEMENTS FROM PEDHAMLI.

1, 5 (173), 3, 7 (170), 8 (172) discoid (cores) from Junction, 2, 6 (241), 4 (159) flakes from Junction, 9.13 (113), 10,14 (122), 11, 15 (76), 12. 16 (182) flakes from Alluvium.



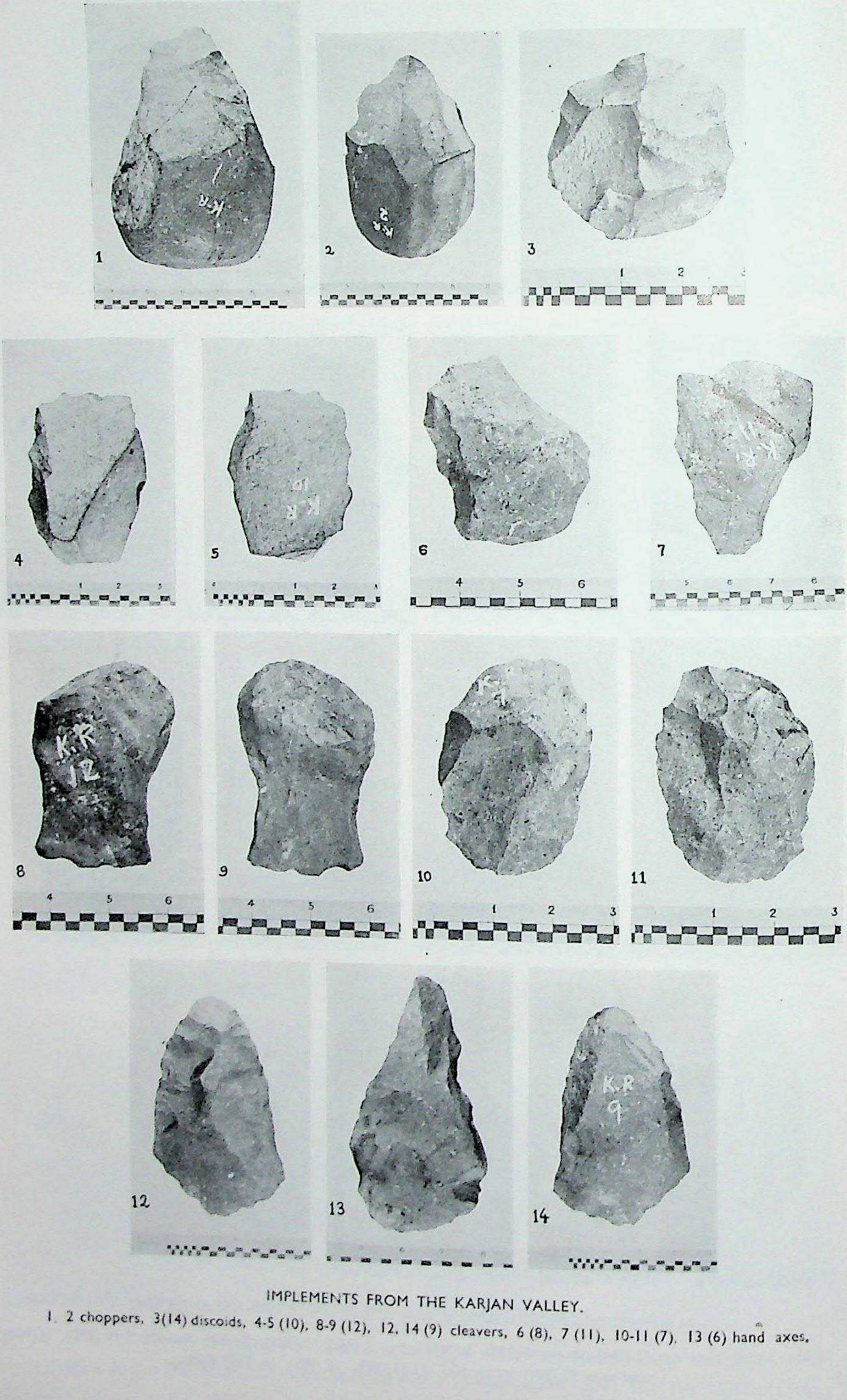
IMPLEMENTS : HAND AXES FROM ALLUVIUM, PEDHAMLI.

1(75), 2 (134), 3 (50), 4 (180), 5-6 (178), 7-8 (226a), 9 (71), 10 (225), 11(69), 12(70), 13-14 (82), 15 (51), 16 (76).



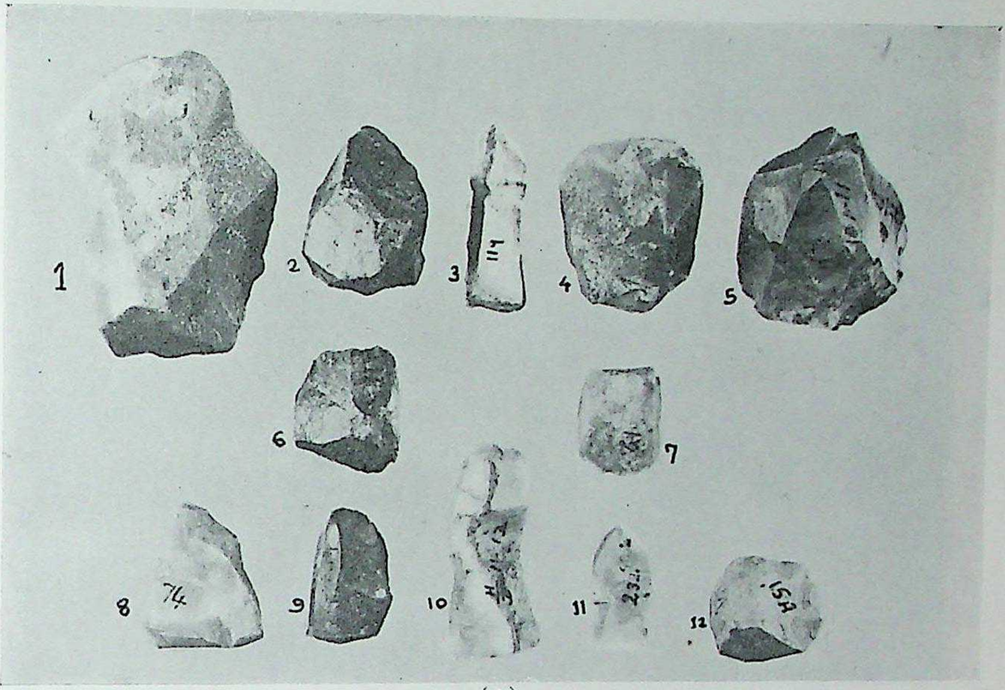
(a-b) IMPLEMENTS FROM HADOL ; (c-d) IMPLEMENTS FROM BAHADARPUR.

1(263), 2 (252) hand axe, 3 (261) cleaver, 4 (259), 5 (267) flakes, 6 (265), 7 (260), 8 (269) discoids, 9-10 (295), 11(300) hand axes, 12 (291) pebble tool, 13-14 (309), 15 (289), 16 (282) flakes.



IMPLEMENTS FROM THE KARJAN VALLEY.

1, 2 choppers, 3(14) discoids, 4-5 (10), 8-9 (12), 12, 14 (9) cleavers, 6 (8), 7 (11), 10-11 (7), 13 (6) hand axes.



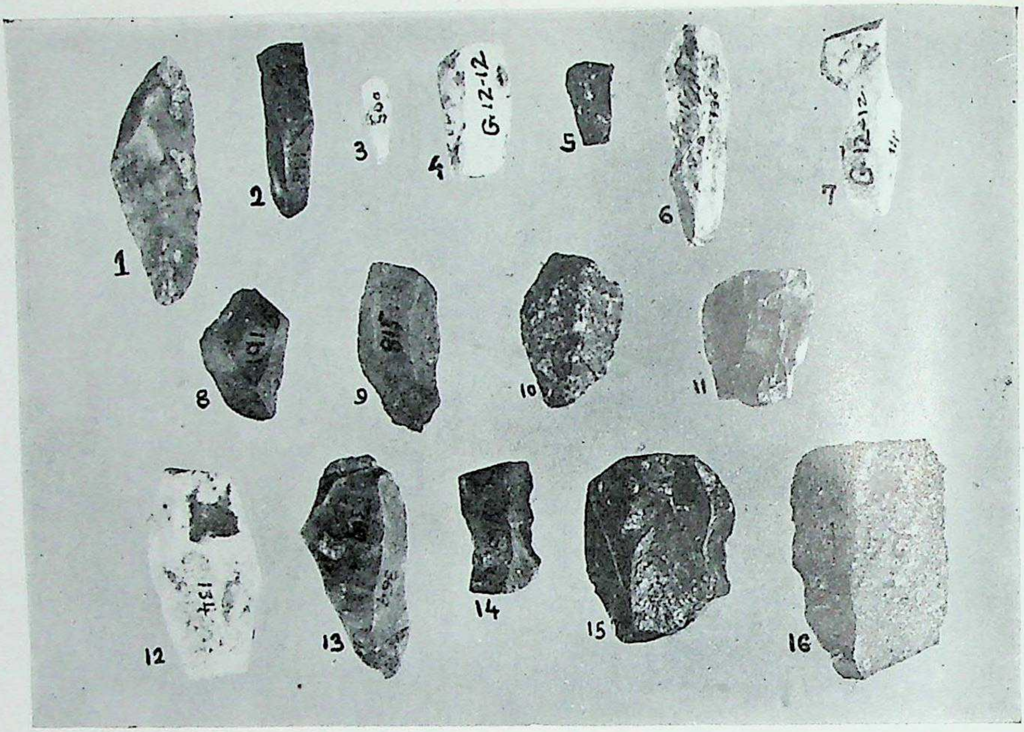
(a)

(b)

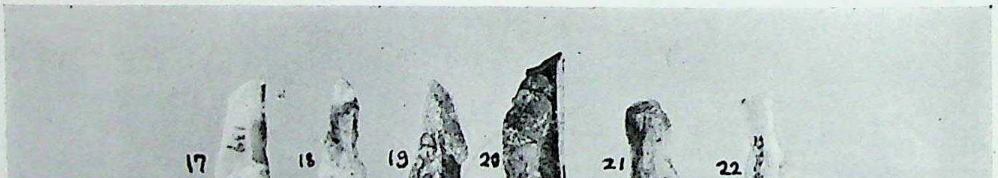
SURFACE MICROLITHS. NATURAL SIZE.

(a) Cores and Core flakes. (b) Large flakes and Neolith-like piece (No. 17).

1(311), 2(793), 3(119), 4(108), 5(106), 6(11), 7(12), 8(74), 9(483), 10(124), 11(232), 12(15A), 13(120), 14(330), 15(313), 16(301), 17(225), 18(178).



(a)

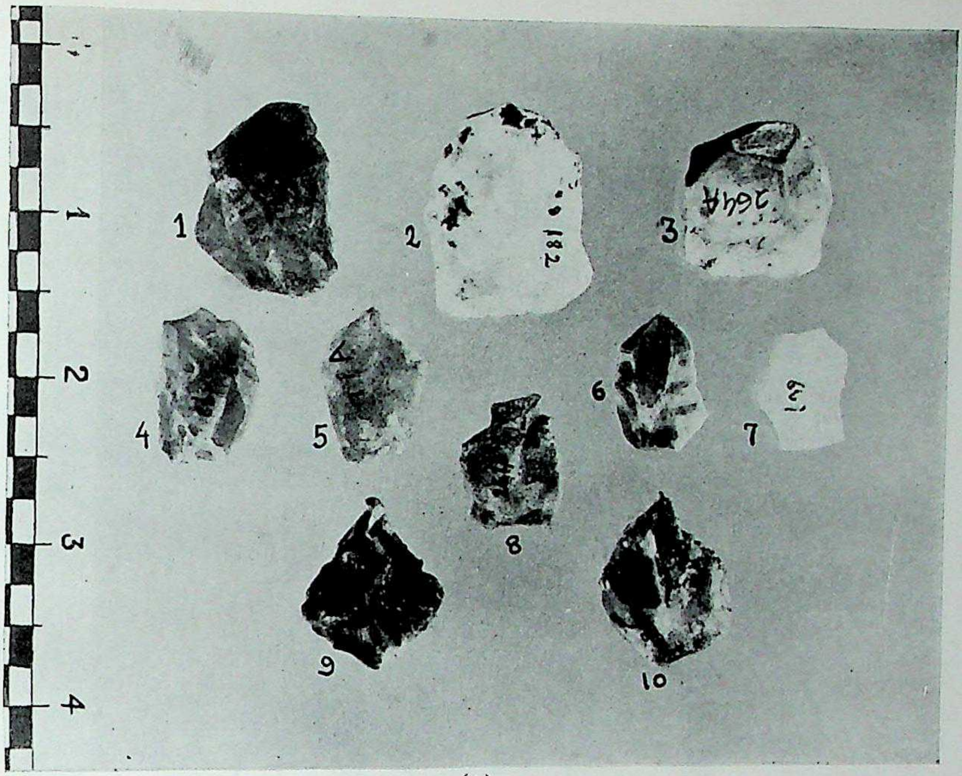


(b)

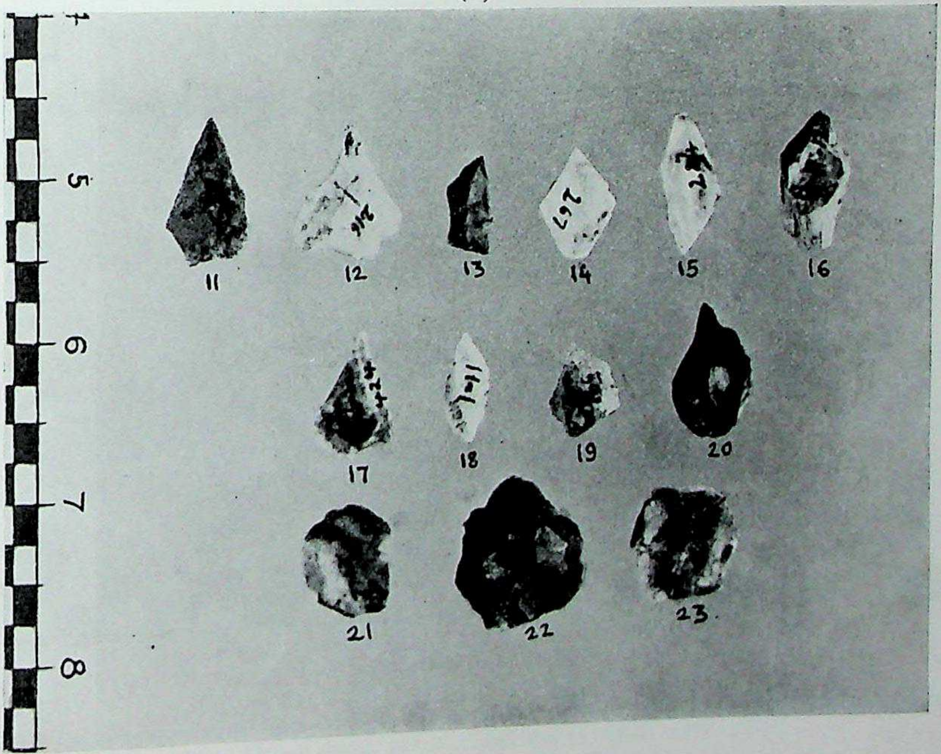
SURFACE MICROLITHS. NATURAL SIZE.

(a) Long, thin and broad 2-edged flakes. (b) Crescent or worked back flakes.

1(16), 2(138), 3(500), 4(235), 5(582), 6(136), 7(234), 8(191A), 9(815), 10(836), 11(26), 12(134), 13(369), 14(819), 15(847), 16(24A), 17(139), 18(173), 19(225D), 20(220B), 21(37), 22(225E), 23(147), 24(466), 25(514), 26 (?), 27(557), 28(259), 29(246), 30(676), 31(163), 32(534), 33(187), 34(172A), 35(158).



(a)

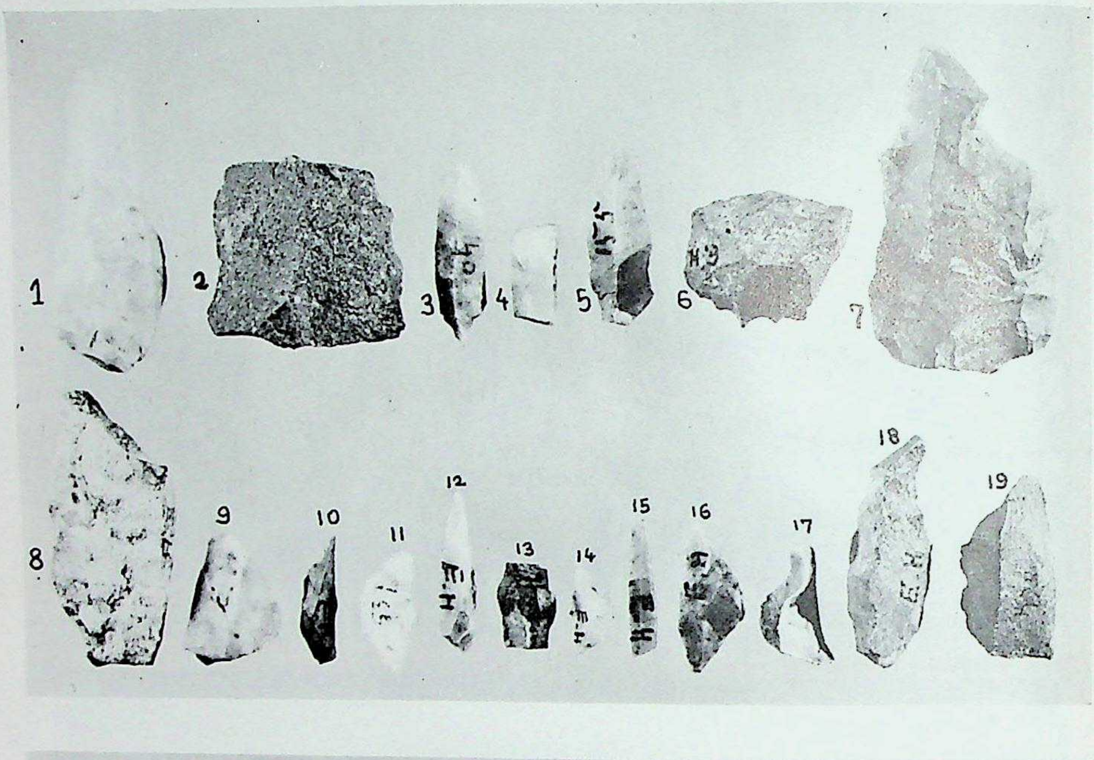


(b)

SURFACE MICROLITHS. NATURAL SIZE.

(a) Flakes (Scrapers). (b) "Points" and "Discs" or "Core-trimmings."

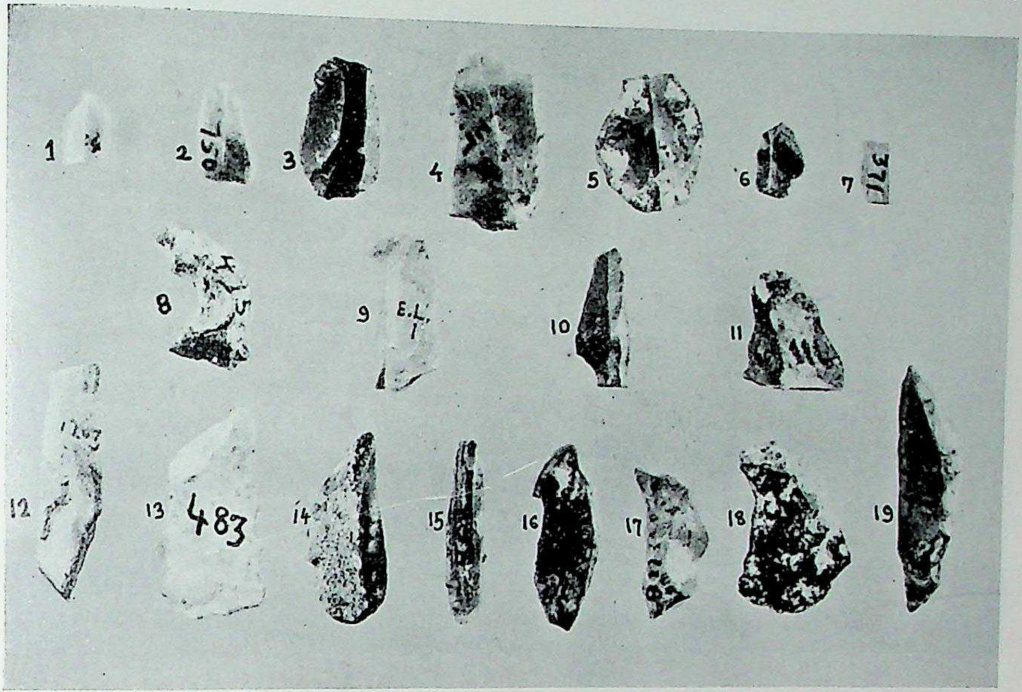
1(191B), 2(182), 3(264A), 4(198), 5(77A), 6(201), 7(667), 8(264), 9(225C), 10(76), 11(225B), 12(216), 13(93), 14(267), 15(224), 16(221), 17(424), 18(425), 19(592), 20(628), 21(70), 22(68A), 23(209).

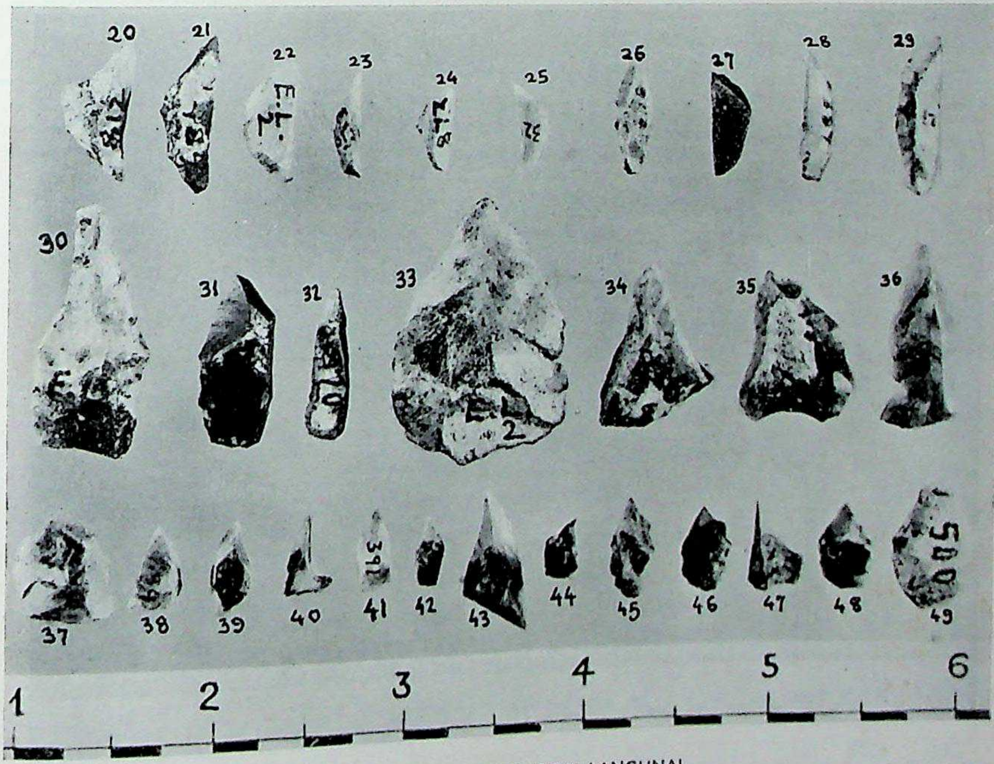


EXCAVATED MICROLITHS FROM HIRPURA.

Cores, Core-flakes, Flakes and "Points." Slightly enlarged.

1(279), 2(308), 3(40), 4(294), 5(155), 6(307), 7(31), 8(411), 9(152), 10(196), 11(537), 12(159), 13(302), 14(50), 15(157), 16(153), 17(44), 18(288), 19(564), 20(521), 21(184), 22(336), 23(165), 24(315).

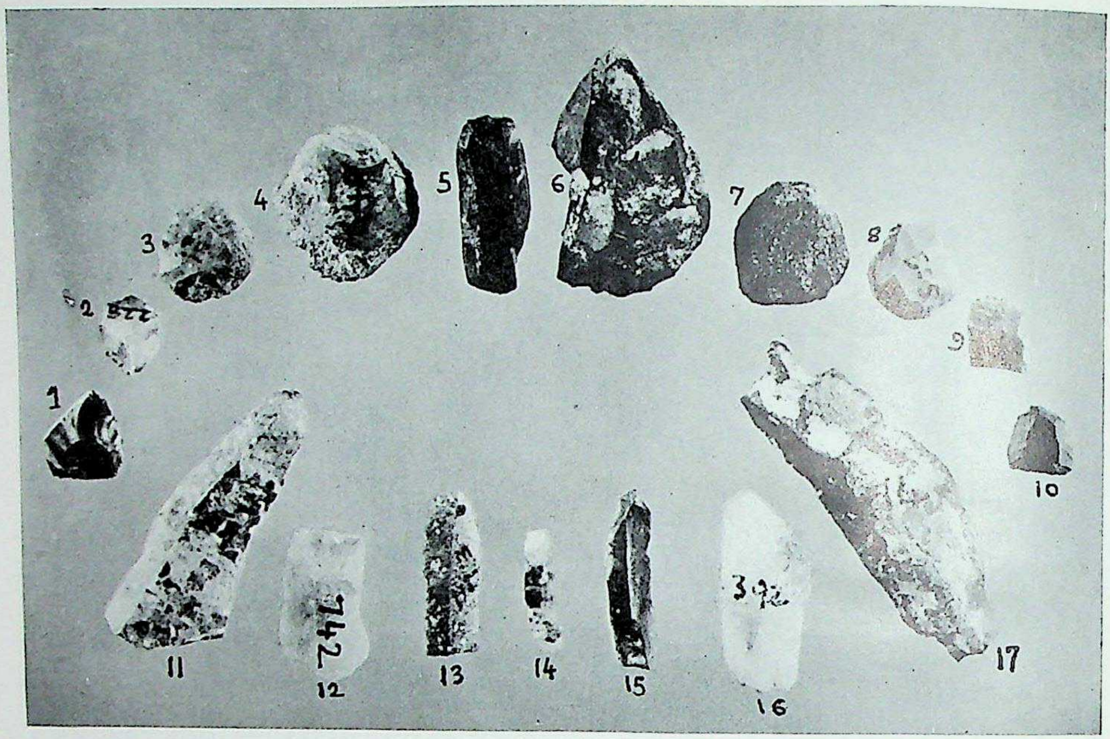




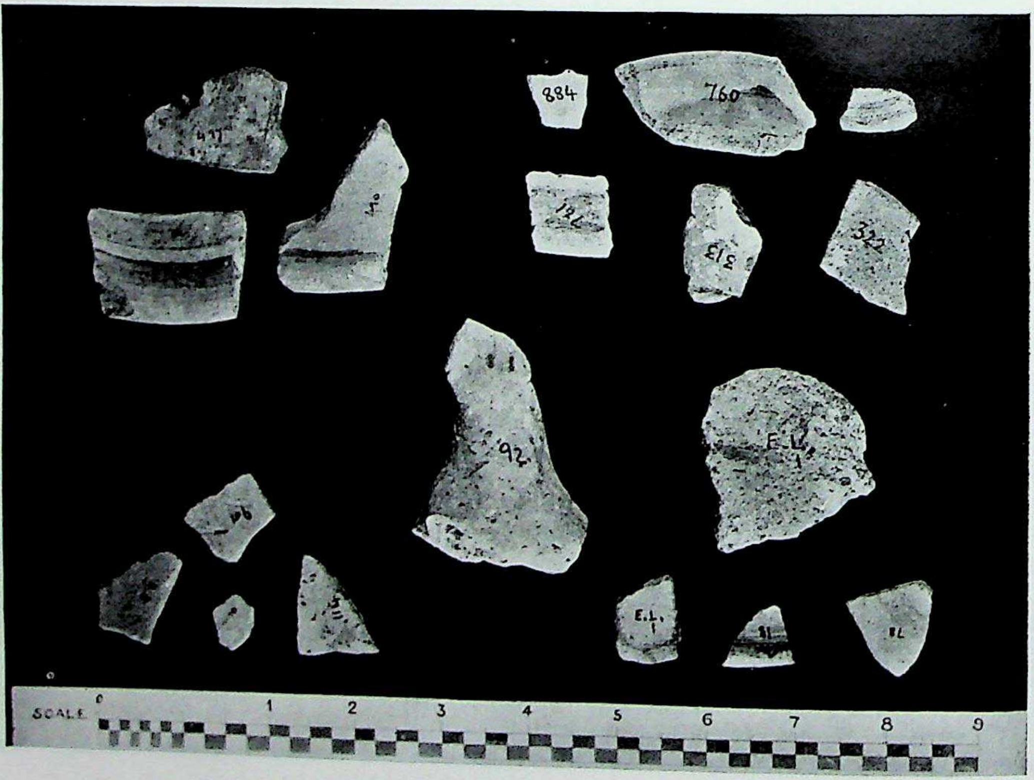
EXCAVATED MICROLITHS FROM LANGHNAJ.

Small and large 2-edged Flakes, Crescents and " Points ". All of almost natural size.

1(224), 2(750), 3(515), 4(508), 5(394), 6(700), 7(371), 8(495), 9(14), 10(22), 11(111), 12(203), 13(483), 14(478), 15(868), 16(393), 17(811), 18(934), 19(480), 20(812), 21(484), 22(940), 23(241), 24(873), 25(32), 26(306), 27(26), 28(387), 29(23), 30(?), 31(641), 32(870), 33(496), 34(876), 35(295), 36(481), 37(277), 38(684), 39(814), 40(339), 41(391), 42(691), 43(229), 44 (?), 45(74), 46(75), 47(683), 48(759), 49(500).



(a)

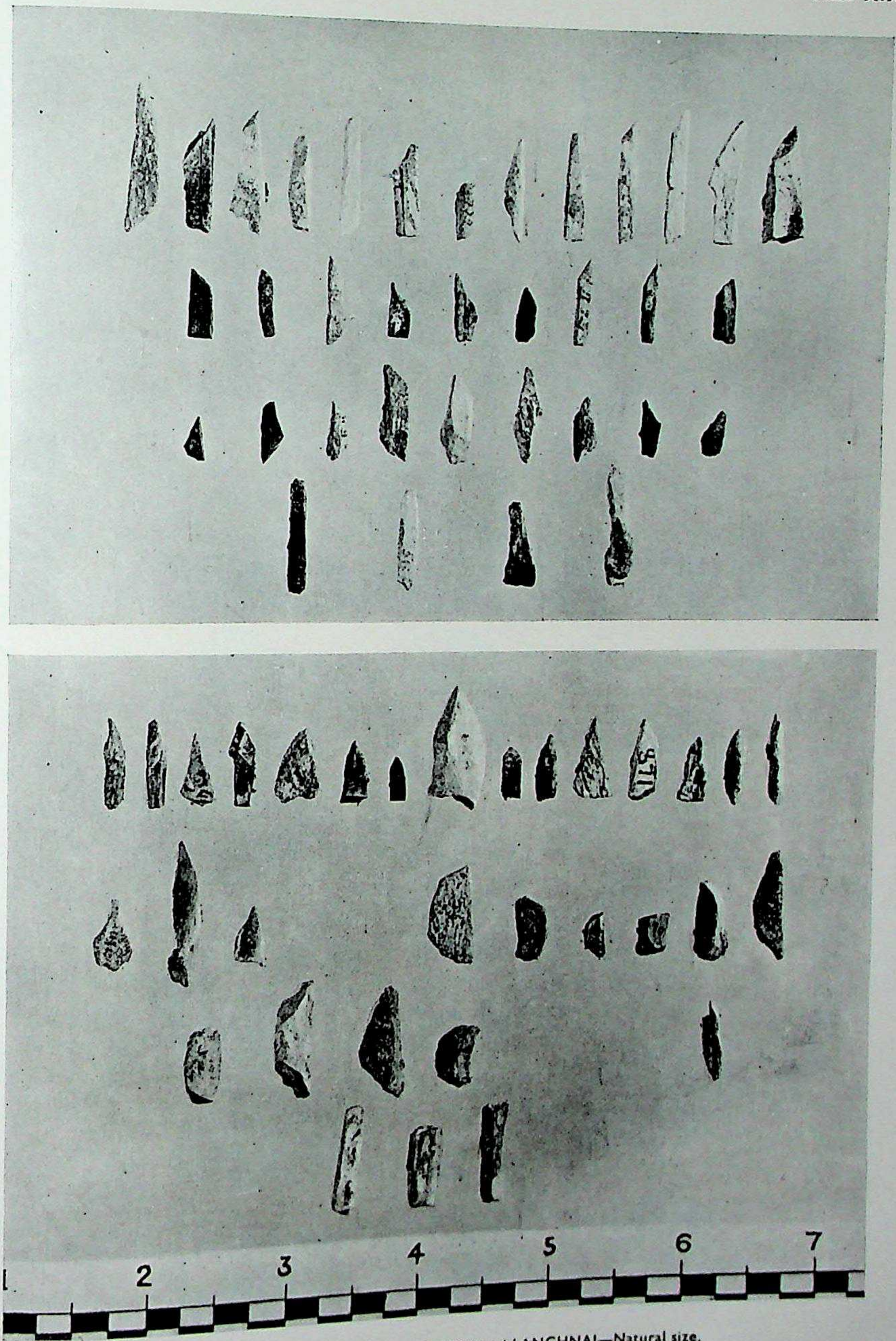


(b)

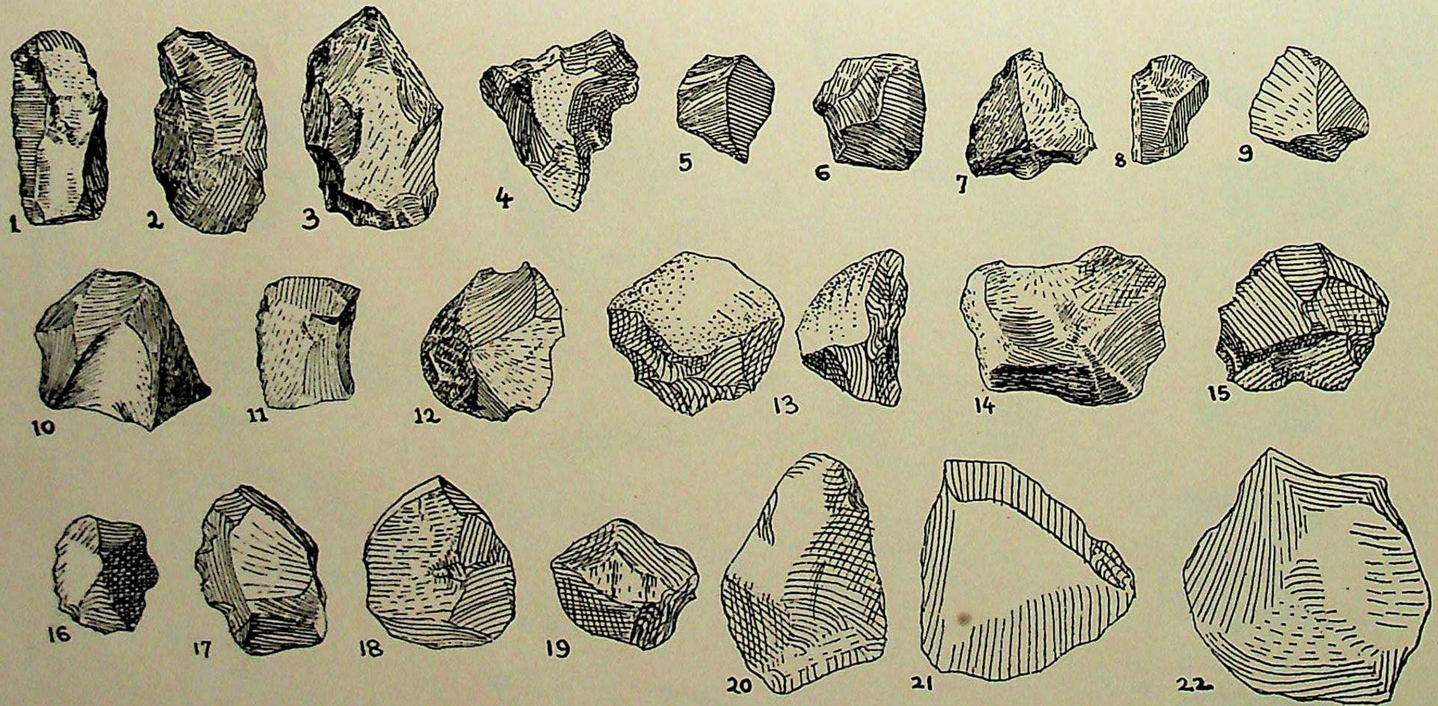
(a) Excavated Microliths from Langhnaj: Cores, " Core trimmings ", large and small two-edged flakes. —Natural size.

(b) Potsherds from excavations at HIRPURA and LANGHNAJ. No. 92 torso of a figurine.

1 (612), 2(228), 3(21), 4(649), 5(195), 6(364), 7(130), 8(505), 9(132), 10(227), 11(59), 12(742), 13(559), 14(718), 15(654), 16(392), 17(474).



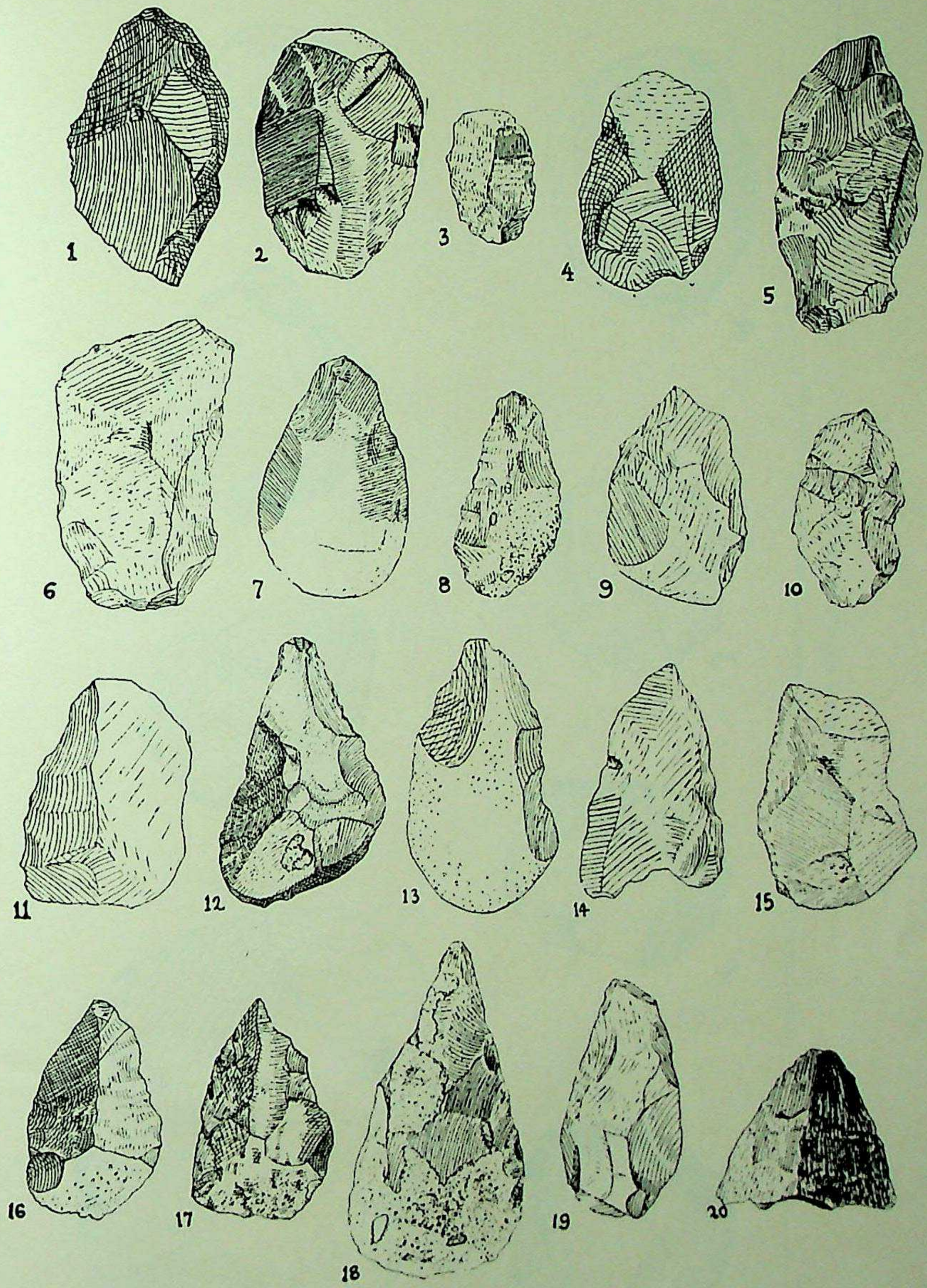
Bone tools from excavations at HIRPURA and LANGHNAJ—Natural size.



Palaeolithic Implements : Flakes and small ovate hand axes.

1(1), 2(244), 3(243), 4(4), 5(7), 6(241), 7(245), 8(2), 9(281), 10(267), 11(113), 12(159), 13(260), 14(210), 15(279), 16(259), 17(192), 18(289), 19(311), 20(300), 21(314), 22(307).

Plate XXI.

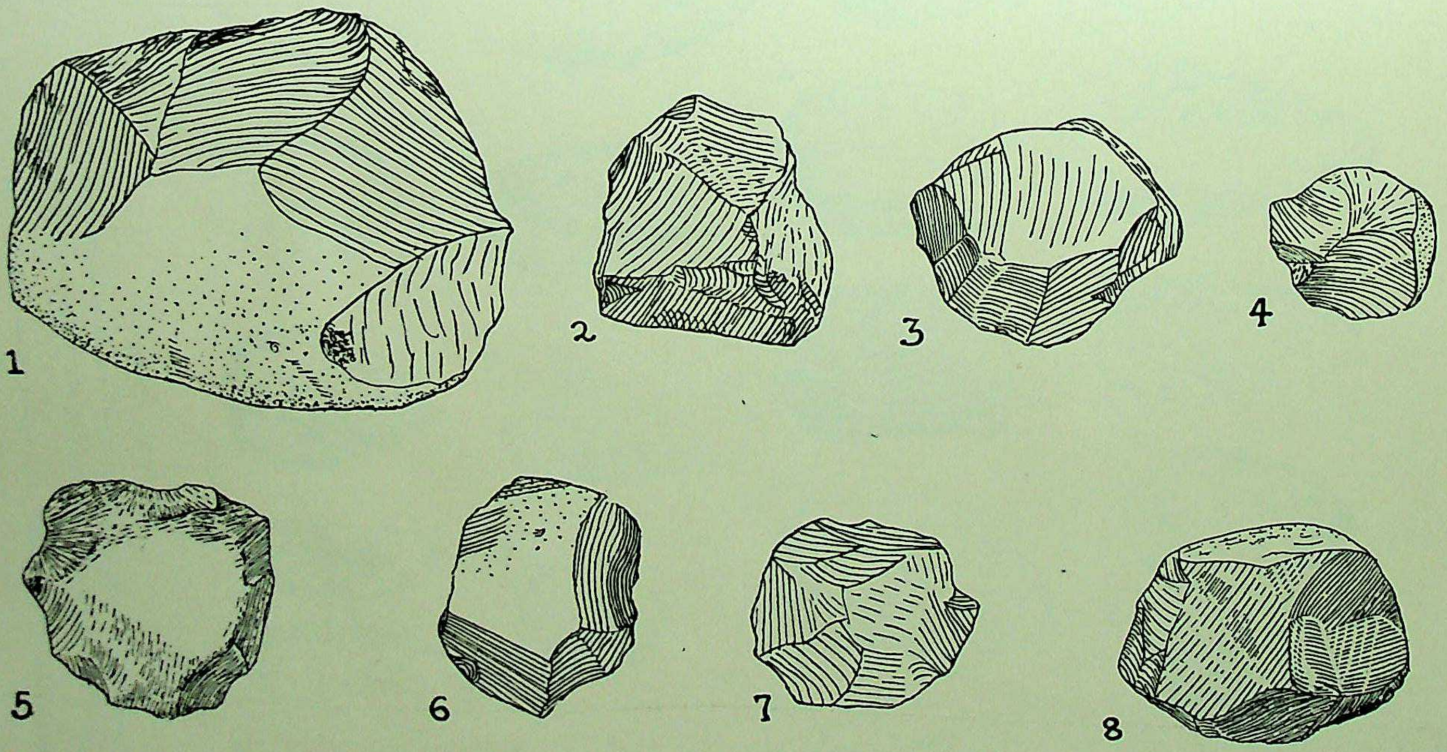


Palaeolithic Implements from Gravel and Gravel Junction.

Ovate, oval, pear-shaped, and triangular types of hand axes and cleavers.

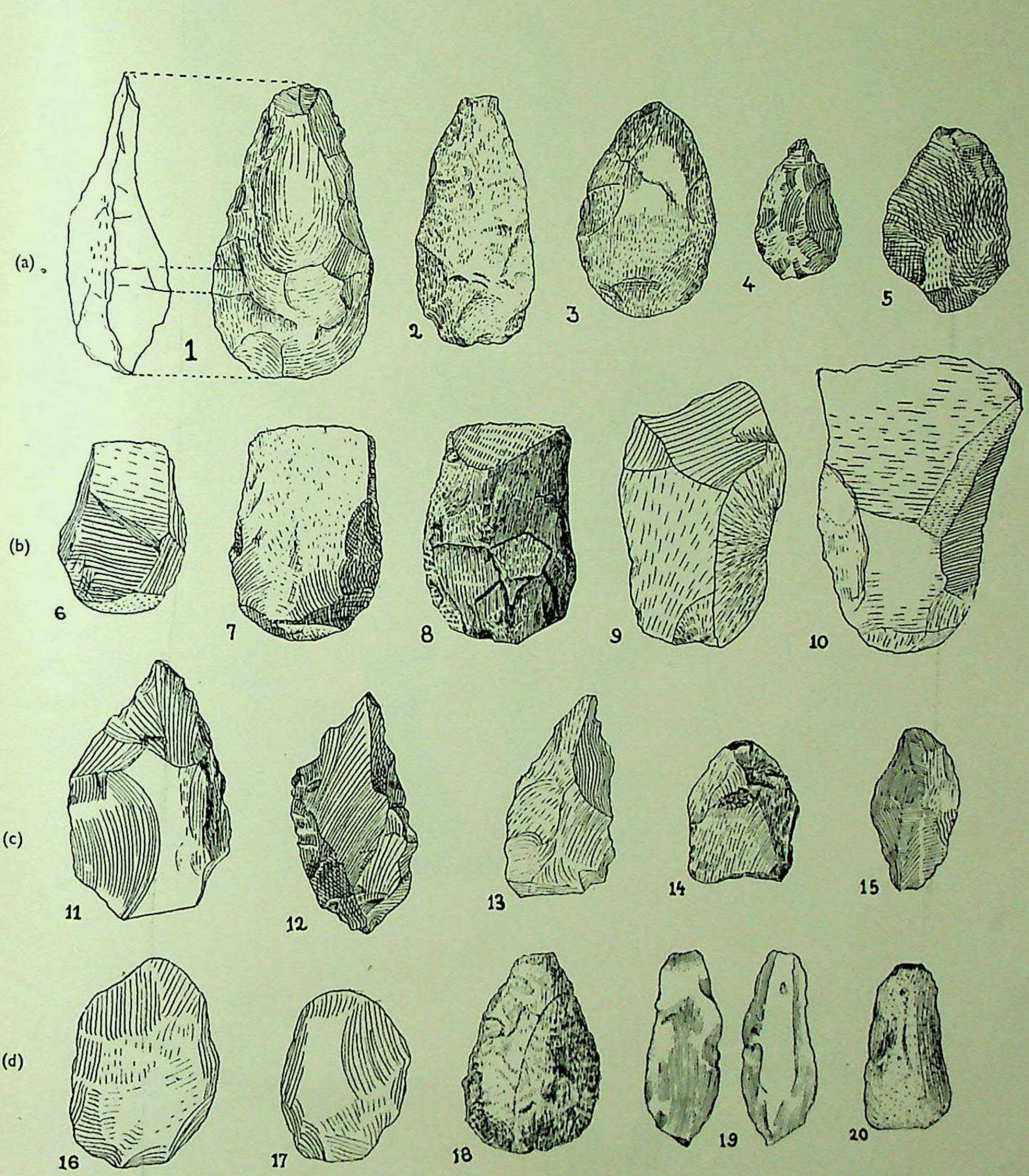
1(6), 2(25), 3(30), 4(28), 5(27), 6(58), 7(139), 8(53), 9(66a), 10(130), 11(136), 12(181), 13(179), 14(201), 15(244a), 16(244), 17(132), 18(226), 19(129), 20(235).

Plate XXII.



Palaeolithic Implements : Discoid cores and flakes from Gravel and Gravel Junction.

1(243), 2-3(173), 4(87), 5(265), 6(111), 7(60), 8(172).

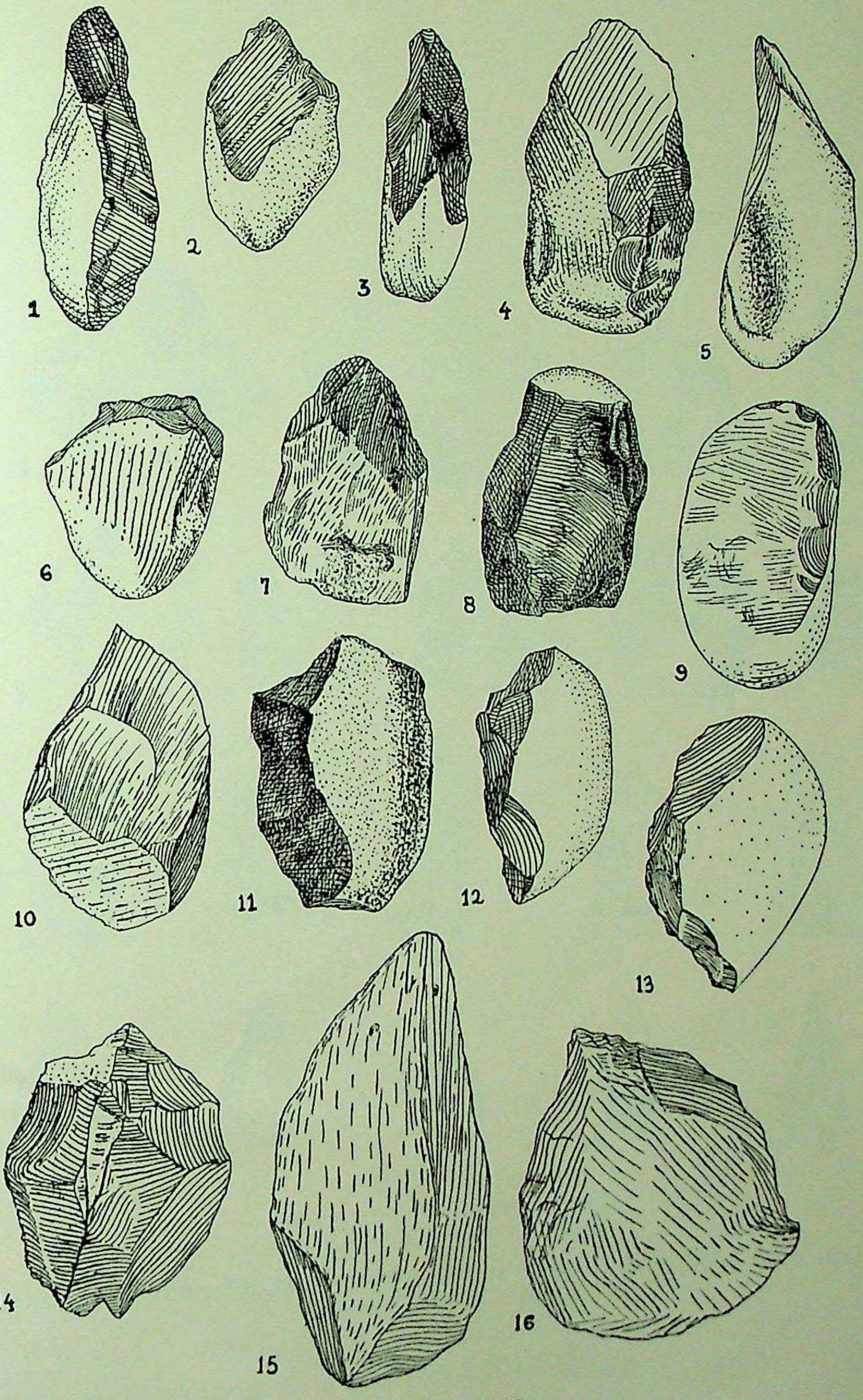


PALAEOLITHIC IMPLEMENTS.

a, b, c : Ovate, pear-shaped, triangular and keeled handaxes and cleavers from Alluvium.

d : Hand axes and blade (excepting 20) from the loose gravel at Bahadarpur on the Orsang.

1(226a), 2(71), 3(69), 4(75), 5(263), 6(224), 7-8(261), 9(198), 10(74), 11(50), 12(178), 13(180), 14(171), 15(82), 16(286), 17(296), 18(295), 19(309), 20(122).

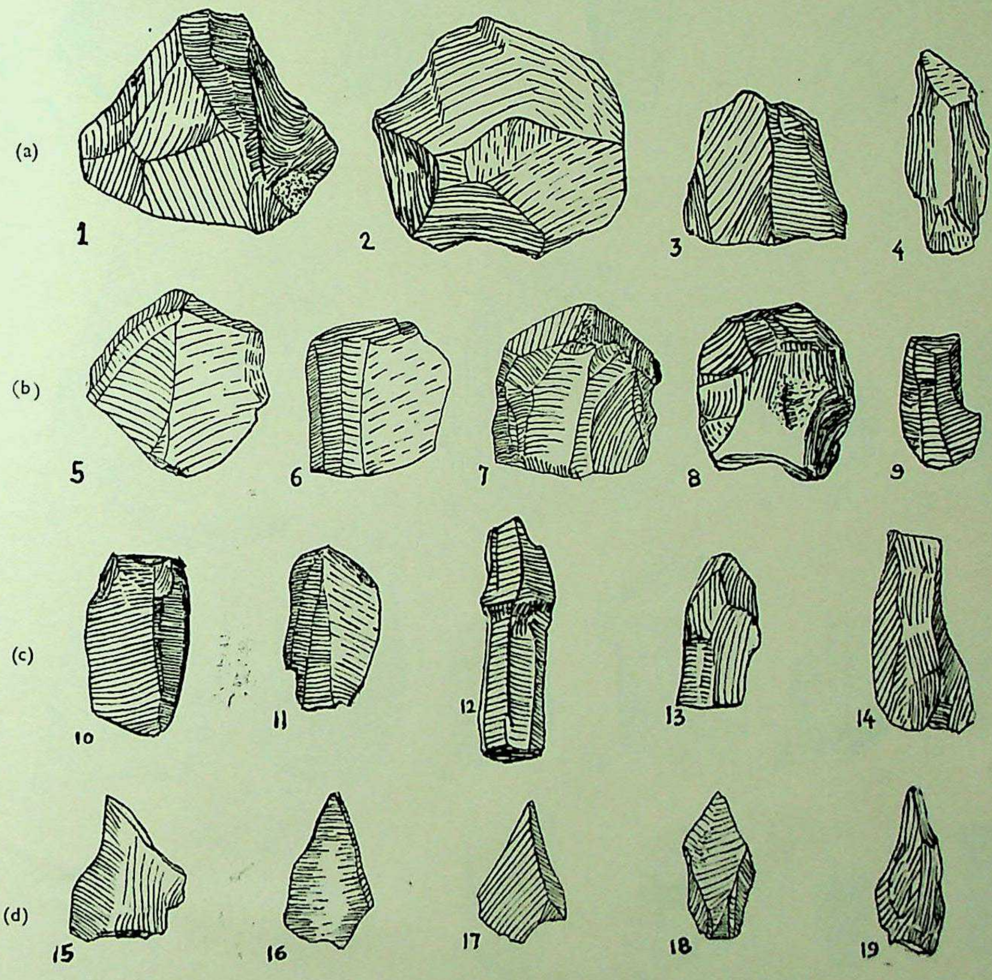


PALAEOLITHIC IMPLEMENTS.

Pebble-tools : Choppers and a rostrocarinate type from different strata on the Sabarmati.

1(24), 2(8), 3(283), 4-5(126), 6(174), 7(205), 8(282), 9(235), 10(135), 11(18), 12(40), 13(219), 14(186), 15(57), 16(124a).

Plate XXV.



SURFACE MICROLITHS : NATURAL SIZE.

a, b, c : Various types of Cores. d : "Points."

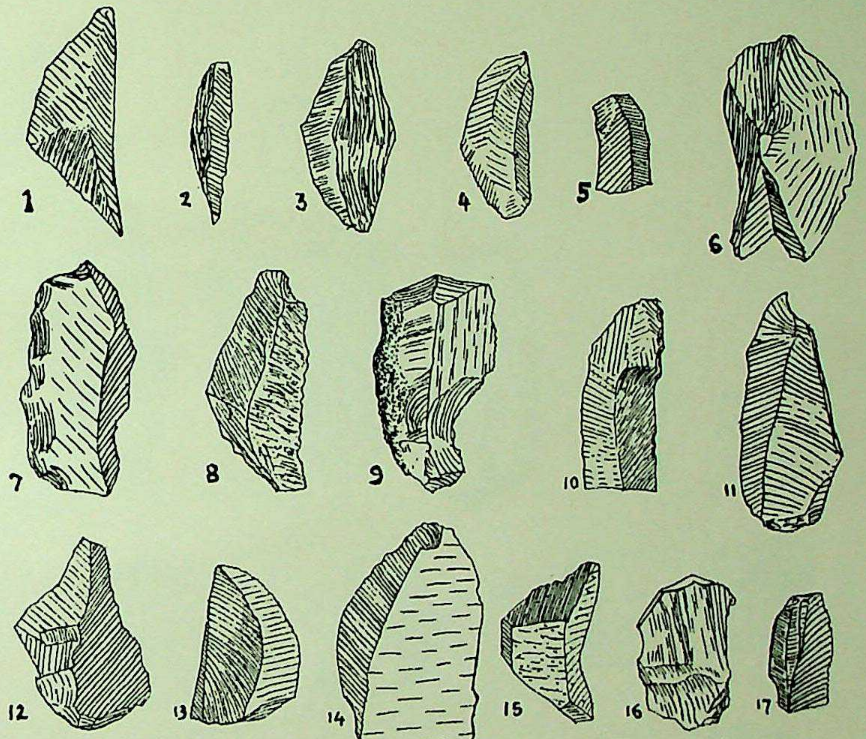
1(P272), 2(685), 3(482), 4(477), 5(697), 6(697), 7(793), 8(797), 9(819), 10(15B), 11(15D), 12(119), 13(232), 14(456), 15(286), 16(725D), 17(424), 18(221), 19(81).

Plate XXVI.

SURFACE MICROLITHS : NATURAL SIZE.

Various types of Flakes (blades, scrapers and " core trimmings").

1(253), 2(264C), 3(220), 4(325), 5(135), 6(330), 7(802), 8(68A), 9(68B), 10(264A), 11(847), 12(311), 13(40), 14(264), 15(687), 16(841), 17(663), 18(350), 19(605), 20(659), 21(337).

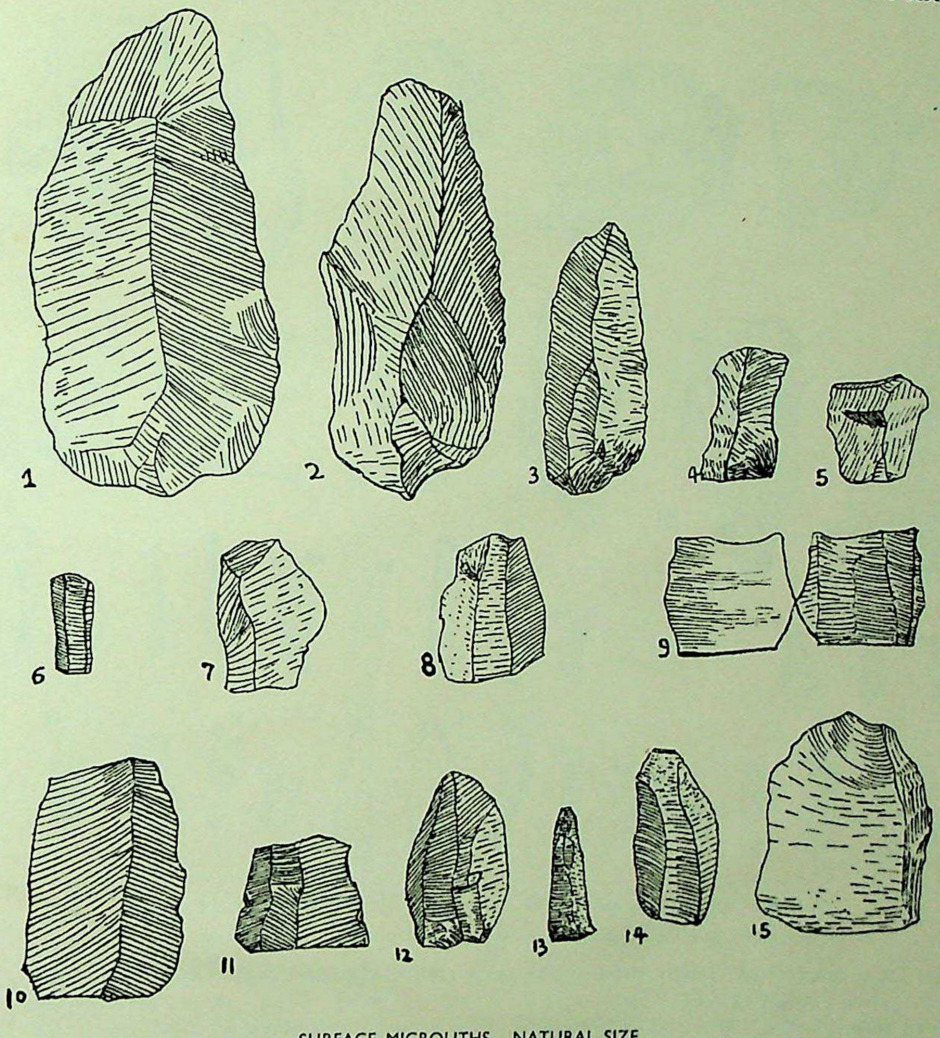


SURFACE MICROLITHS : NATURAL SIZE.

Various types of Flakes (crescents).

1(466), 2(552), 3(264D), 4(246), 5(319), 6(565), 7(169), 8(831), 9(58), 10(495), 11(367), 12(402), 13(190), 14(456), 15(842), 16(164), 17(   ), 18(37), 19(191A), 20(45), 21(247), 22(352), 23(449).

Plate XXVIII.

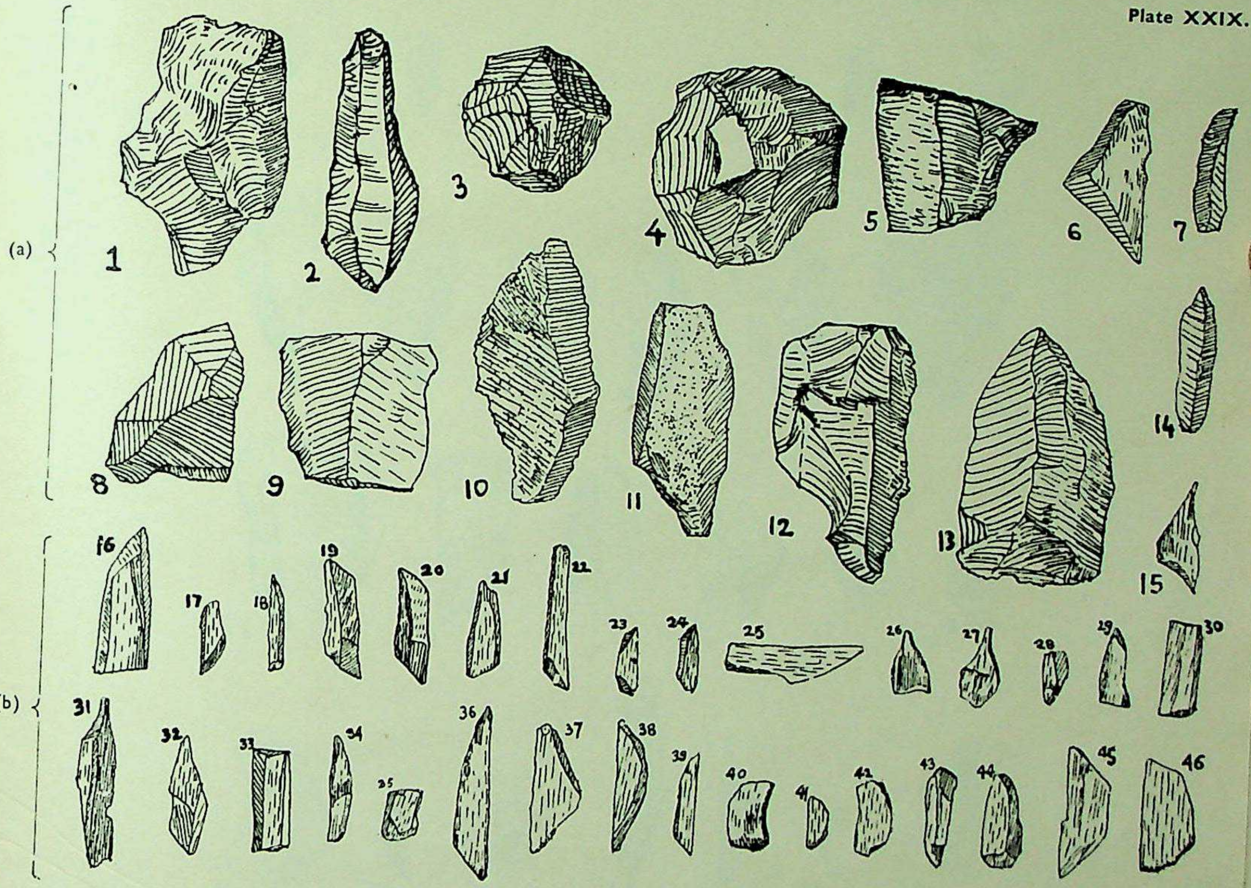


SURFACE MICROLITHS. NATURAL SIZE.

Various types of flakes (2-edged blades).

1(301), 2(213), 3(276), 4(819), 5(   ), 6(821), 7(258), 8(926), 9(204), 10(24A), 11(207), 12(150), 13(20), 14(815), 15(182).

Plate XXIX.

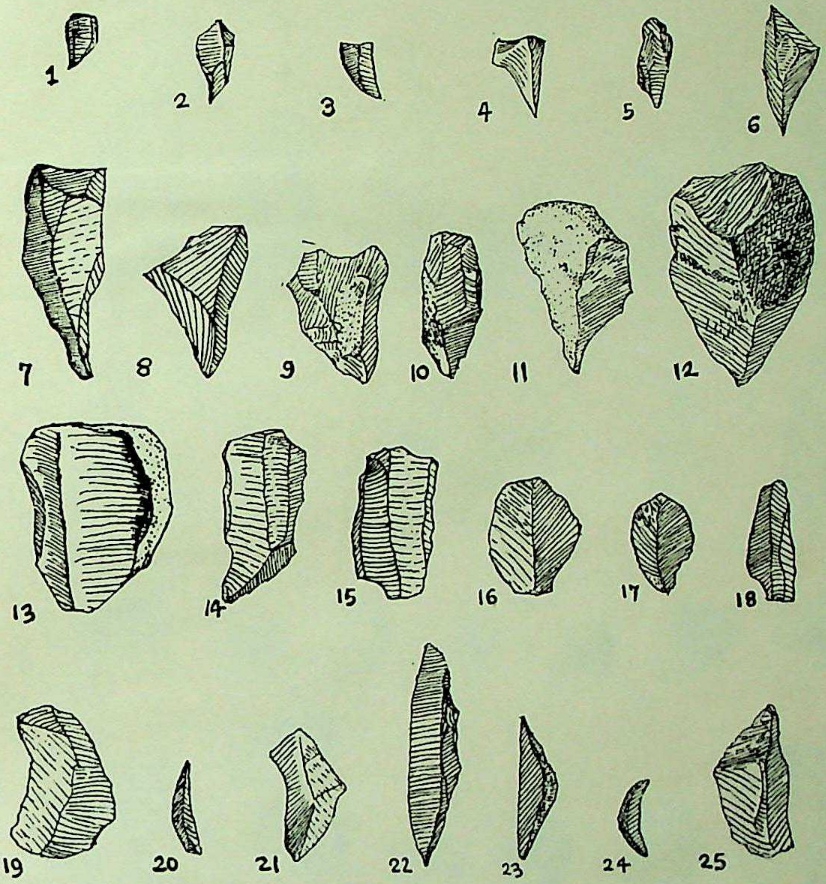


(a) Excavated Microliths from Hirpura. Cores, Flakes and " Points". Nos. 1-15.

(b) Excavated bone tools from Hirpura and Langhnaj. Nos. 16-46. Natural Size.

1(227), 2(279), 3(306), 4(337), 5(59), 6(321), 7(295), 8(338), 9(308), 10(343), 11(411), 12(31), 13(315), 14(40), 15(327), 16(820C3), 17( ), 18( ), 19( ), 20( ), 21( ), 22(917A), 23( ), 24( ), 25(623), 26(695), 27(404), 28( ), 29( ), 30( ), 31(415), 32( ), 33( ), 34(895), 35(90), 36(786A), 37( ), 38( ), 39( ), 40(667), 41( ), 42(52), 43( ), 44( ), 45(820G), 46(667A1).

Plate XXX.

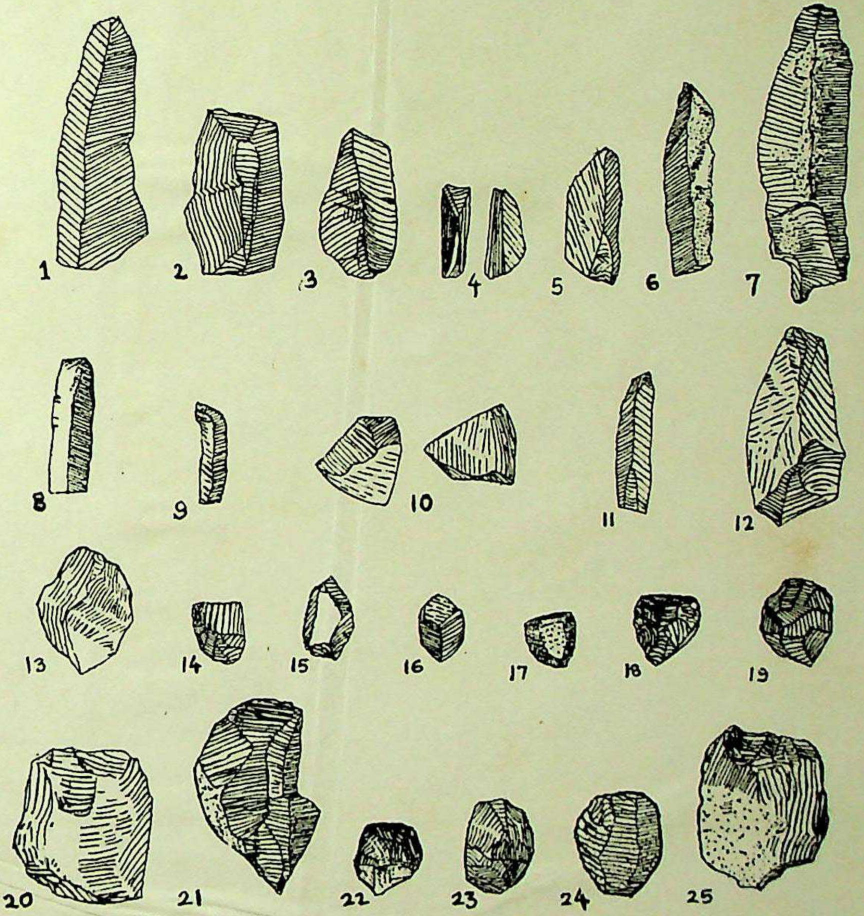


EXCAVATED MICROLITHS FROM LANGHNAJ. NATURAL SIZE.

" Points ", broad 2-edged and crescent flakes.

1(178), 2(814), 3(685), 4(683), 5(74), 6(229), 7(417), 8(876), 9(295), 10(641), 11(377), 12(496), 13(460), 14(483), 15(508), 16(394), 17(   ), 18(22), 19(934), 20(241), 21(382), 22(480), 23(484), 24(32), 25(379).

Plate XXXI.

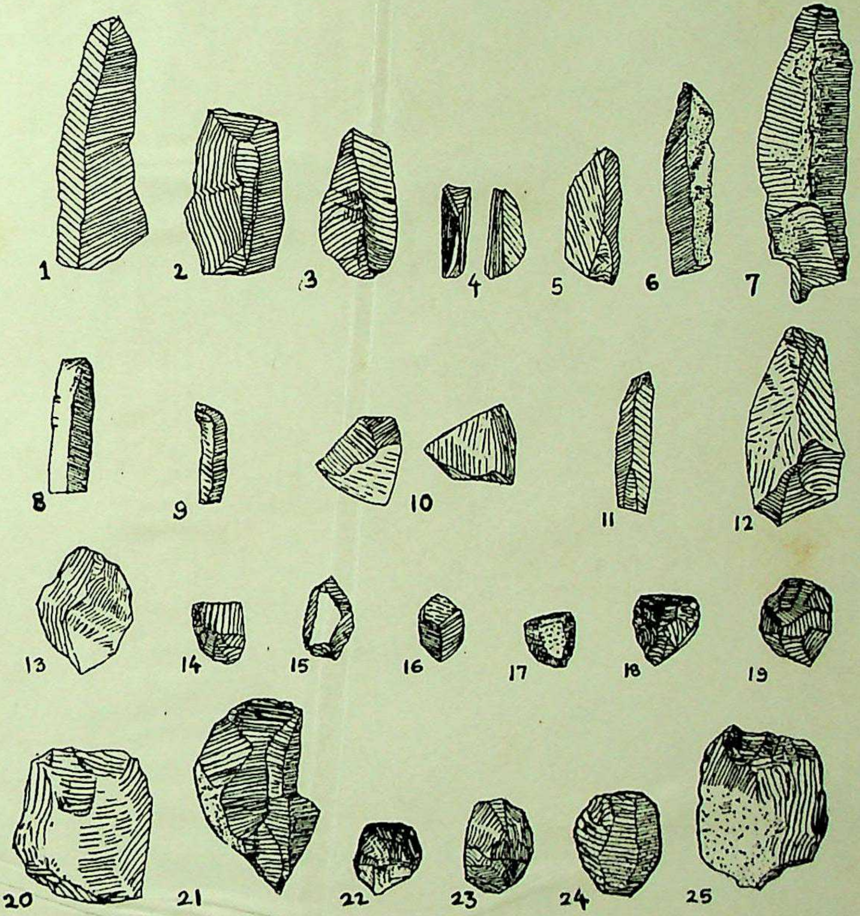


EXCAVATED MICROLITHS FROM LANGHNAJ. NATURAL SIZE.

Flakes, grinder (No. 4), Cores and "Core Trimmings."

1(89), 2(928), 3(732), 4(26), 5(808), 6(203), 7(474), 8(655), 9(814), 10(503), 11(654), 12(276), 13(737), 14(132), 15(741), 16(228), 17(227), 18(710), 19(21), 20(355), 21(364), 22(505), 23(112), 24(130), 25(720).

Plate XXXI.



EXCAVATED MICROLITHS FROM LANGHNAJ. NATURAL SIZE.

Flakes, grinder (No. 4), Cores and " Core Trimmings."

1(89), 2(928), 3(732), 4(26), 5(808), 6(203), 7(474), 8(655), 9(814), 10(503), 11(654), 12(276), 13(737), 14(132), 15(741), 16(228), 17(227), 18(710), 19(21), 20(355), 21(364), 22(505), 23(112), 24(130), 25(720).